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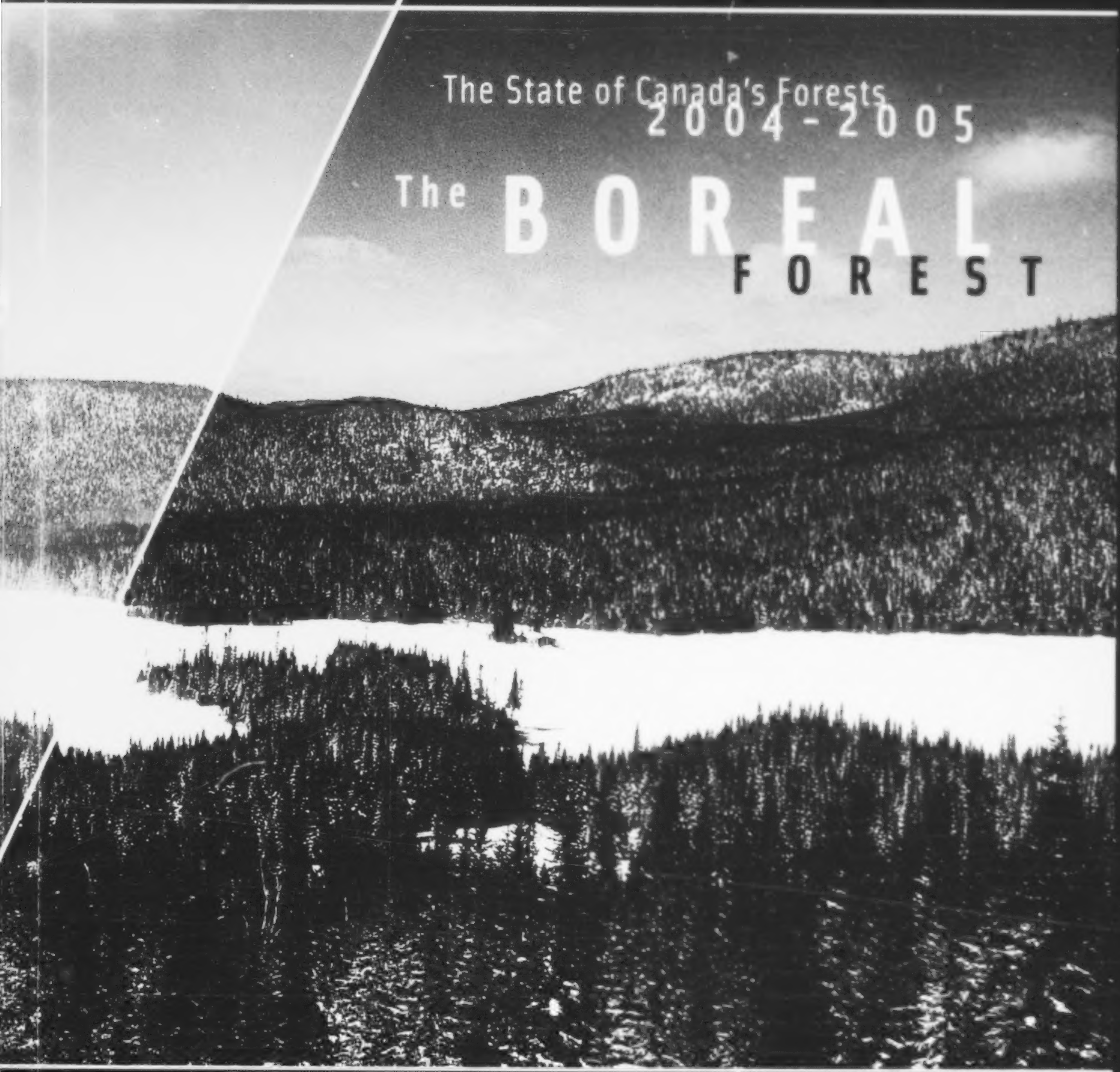

The State of Canada's Forests 2004-2005

The BOREAL FOREST

Natural Resources Canada
Ressources naturelles Canada

Canada

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MINISTER'S MESSAGE

I am pleased to present the 15th edition of *The State of Canada's Forests*. This year, we focus on the boreal forest, a vast and invaluable resource that circles the northern hemisphere and makes up 77 percent of Canada's entire forest cover.

Within this report are examples of the work being done to ensure Canada's boreal forest remains healthy, now and in the future. You will find articles on subjects as diverse as remote sensing and non-timber forest products; updates on partnerships between governments and environmental groups; and points of view from all stakeholders, including Aboriginal peoples, industry and youth.

In Canada, the boreal forest contributes to our quality of life—particularly for those who live and work in the mostly rural communities that often rely on the resources of a healthy forest for their economic, environmental and social well-being.

Those who call the boreal forest home must be included in any discussion on its future. Boreal communities are an important voice that must be heard. Together with my provincial and territorial counterparts, we are discussing plans for a national dialogue to stimulate and facilitate discussion on issues surrounding the boreal forest.

Through the Canadian Council of Forest Ministers, we are also beginning to develop plans to engage our counterparts in the other boreal nations—Russia, the Scandinavian countries, Japan and the United States—in meaningful discussions about the sustainable development of this global endowment.

I am proud of Canada's place as one of the most advanced forest nations in the world. Through our partnership approach, Natural Resources Canada will continue to work to achieve a healthy forest and strong forest sector for the well-being of present and future generations.

R John Efford

The Honourable R. John Efford
Minister of Natural Resources Canada

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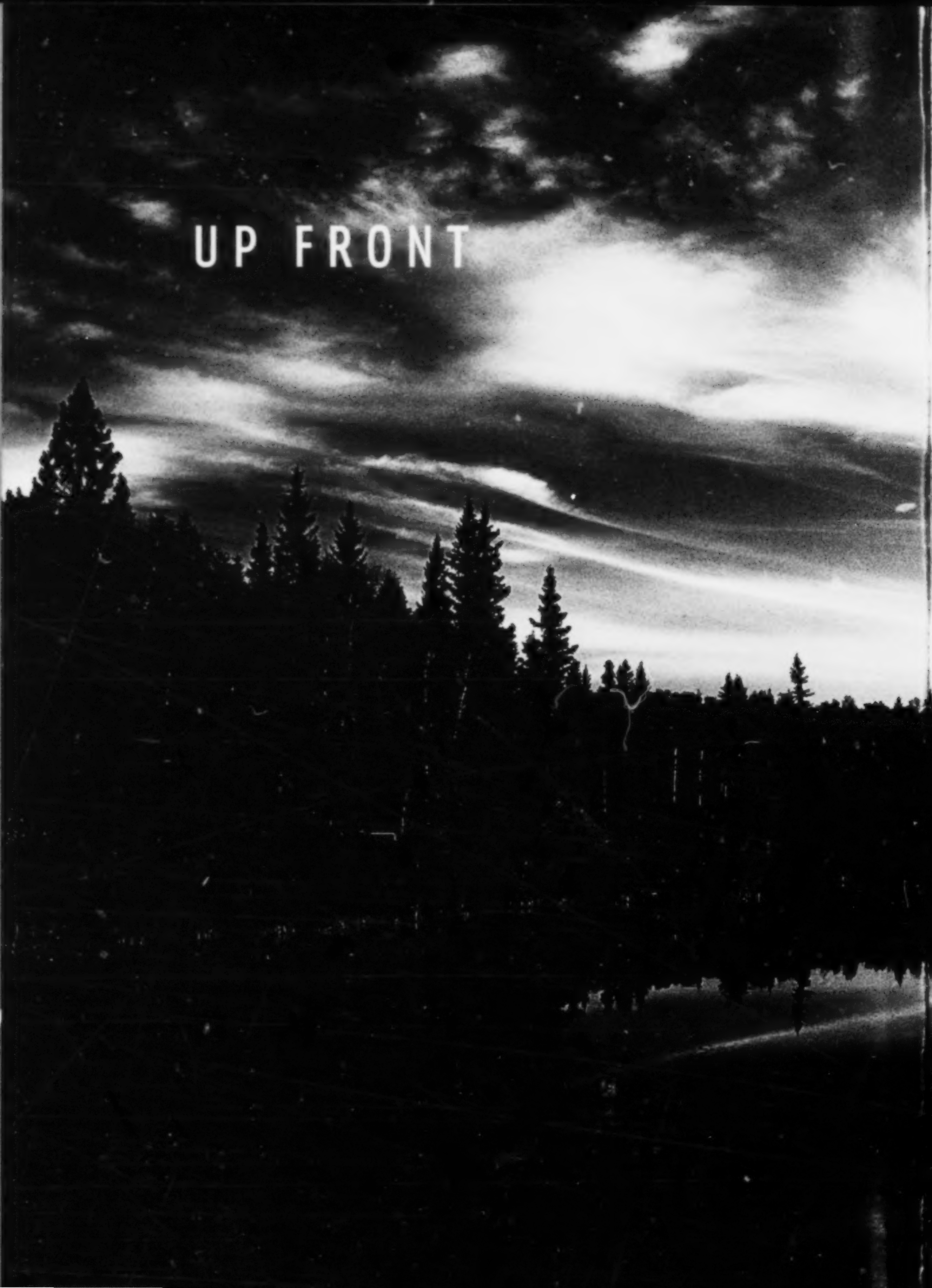
UP FRONT



OVERVIEW OF CANADA'S FORESTS

Forests and forest resources are an integral part of Canadian life. Comprising about half of Canada's landmass, well over 400 million hectares of forests moderate climate, purify water, stabilize soil and provide sanctuary for wildlife. This wealth is vital to Canadian geography, culture and industry. It provides a place of beauty and well-being in which to rest and play. And it feeds the dreams and imaginations of Canadians and visitors alike.

For the many Canadians who live or work in forested areas, the forests provide material, cultural and spiritual sustenance. Aboriginal people use their community forest resources—timber, wildlife, herbs and medicinal plants—in a sustainable manner. Maple sap, mushrooms, resins and craft-making materials are harvested by communities and entrepreneurs.

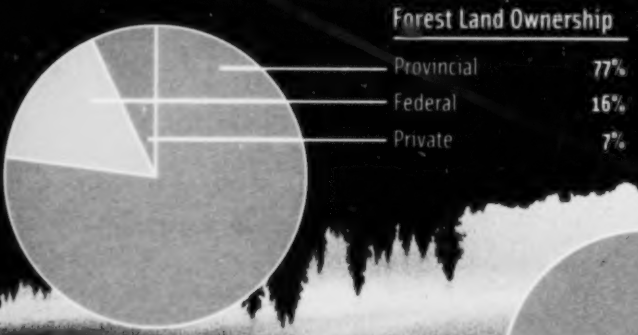
Wood is the pride of many Canadians, not only in the form of standing timber but also in the structure of our buildings and the material of everyday objects. The logging industry harvests about 0.3 percent of the trees to provide these things for the domestic and the international market. Environmental groups monitor forest conditions and report on how well we are preserving our forest riches. And federal, provincial and territorial governments oversee and integrate all of this activity through policy and legislation.

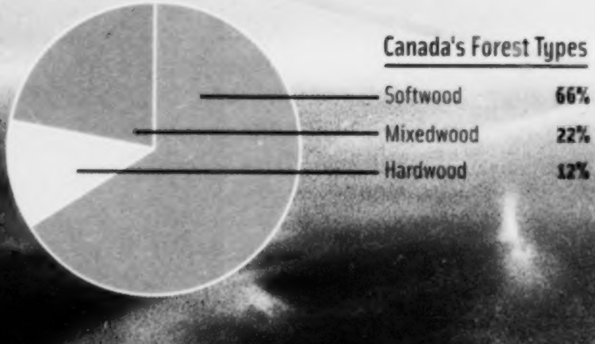
The forest industry, a strong financial contributor to the Canadian economy and the gross domestic product, brings in about $80 billion annually. More than 361 000 individuals find direct employment in the forest industry. Tourism related to Canadian forests also gives Canada's economy a boost.

Canadian citizens across the country use the forests for recreation, from weekend camping trips to educational wilderness vacations. The beauty of scenic views, the nearness of forest wildlife, and the purer air and water of this natural environment can bestow a sense of peace and well-being.

From the lush rainforests of British Columbia, to the boreal forests stretching from west to east, to the sparsely wooded areas at the Arctic tree line, our forests are an invaluable natural resource. Because the forests have always been a part of the Canadian ethos, we can easily take them for granted. But Canadian forests today face serious challenges.

The effects of climate change are not yet totally clear, but significant changes are predicted with regard to fire and insect disturbances, ecosystems, plant growth and the carbon cycle. Adaptation strategies to cope with the coming changes are being explored.





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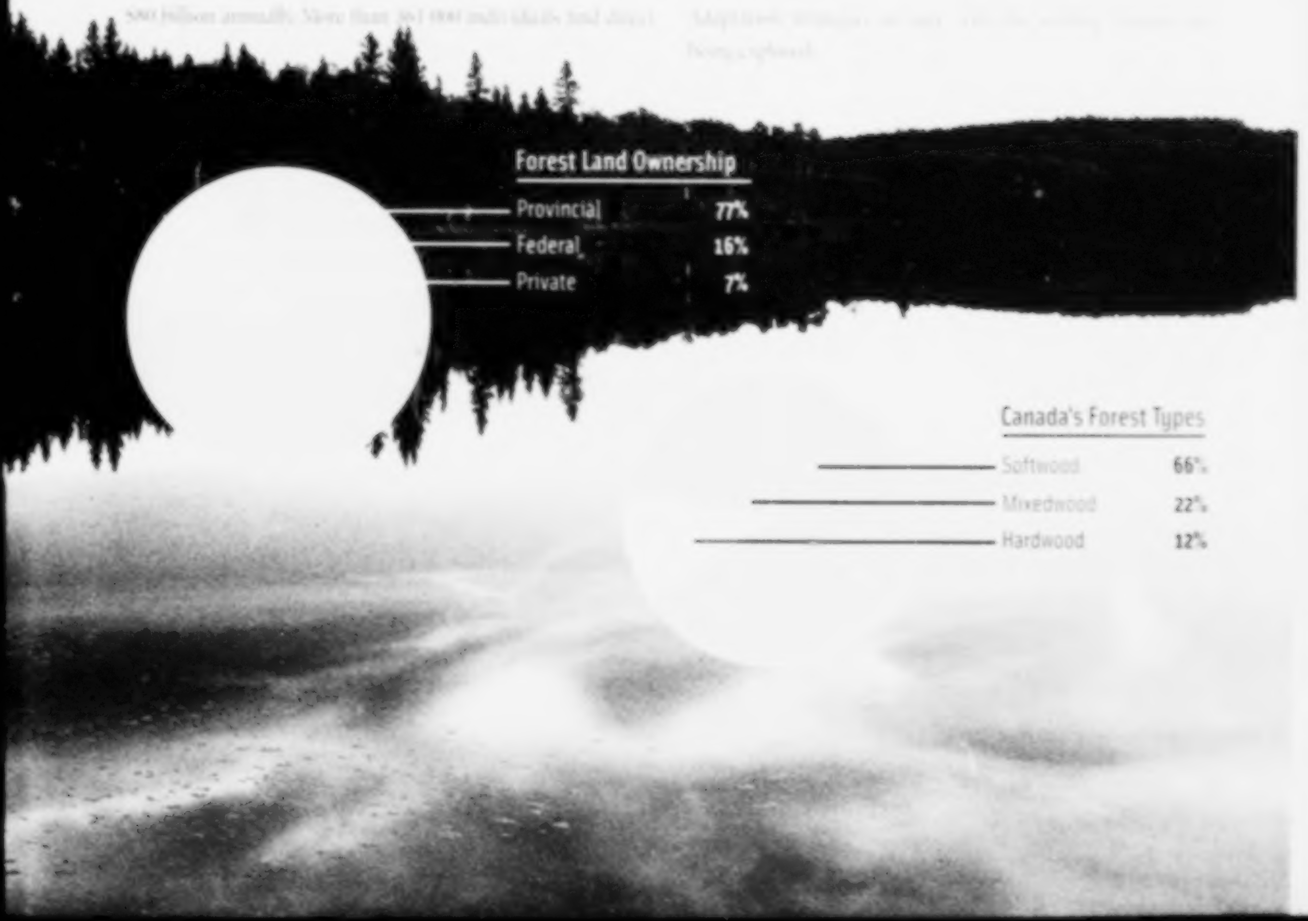

FOREST

- Canada has a total of 979.1 million hectares of land, of which **402.1 MILLION** hectares are **FOREST AND OTHER WOODED LAND**.
- Of this 402.1 million hectares, **92 MILLION** are **"OTHER WOODED LAND,"** consisting of treed wetland as well as slow-growing and scattered-treed land.
- Canada has **310.1 MILLION** hectares of **FOREST LAND**; of this, **294.8 MILLION** hectares are **NOT RESERVED** and therefore potentially available for commercial forest activities.
- Of the 294.8 million, **143.7 MILLION** hectares are most likely to be subject to **FOREST MANAGEMENT ACTIVITIES**.
- Of these 143.7 million, **0.9 MILLION** hectares of forest are **HARVESTED ANNUALLY**.
- **FOREST PRODUCTS' CONTRIBUTION** to the Canadian economy (GDP) in 2004 was **$35.9 BILLION**, slightly higher than the 2003 contribution of $33.7 billion.
- The value of **FOREST PRODUCT EXPORTS** increased in 2004 to **$44.6 BILLION** from the 2003 total of $39.6 billion.
- **NON-TIMBER FOREST PRODUCTS** contributed over **$725 MILLION** to the Canadian economy in 2004.
- **DIRECT EMPLOYMENT** decreased by 15 200 person-years to 361 100 in 2004. This result is consistent with the trends observed in the last 10 years.
- The number of **FOREST FIRES** in Canada in 2004 was **6 634**, below average for the year compared to the 10-year average of 7 631.
- The amount of **FORESTED LAND BURNED** in 2004 was **3.3 MILLION** hectares, slightly above the 10-year average of 2.8 million hectares.
- Canada has **15 TERRITORIAL ECOZONES**, 11 of which are in forest areas.
- About **93 000** of Canada's estimated 140 000 species of **PLANTS, ANIMALS AND MICRO-ORGANISMS** live in the forest.
- **TREE SPECIES** indigenous to Canada total **180**.

FOREST SECTOR–ENVIRONMENTAL TRACK RECORD

- New operational harvesting techniques have reduced industry's ecological footprint in the forest.
- Pulp and paper mills have greatly reduced their greenhouse gas emissions–to 28% below 1990 levels.
- Industry has virtually eliminated chlorinated dioxins.
- Since 1989, industry has spent $2.6 billion on recycling.
- Canadian mills recycled 5 million tonnes of paper into new products in 2003.
- Of the fibre for new Canadian paper, 24% comes from recovered paper and 56% from chips or sawmill residues, for a total of 80%. This is the highest content of recycled paper and residues ever used in the making of Canadian paper.
- Today, 55% of the pulp and paper sector's energy consumption comes from biomass, a renewable resource.
- Sustainable forest management certification has tripled in the last two years. Canada has more certified forest land than any other country in the world.

FOREST FACTS

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Environmental degradation has often resulted from human activities such as oil and gas exploration, hydro-electric projects, logging, and expansion of urban dwellings into rural forested environments. Another ongoing challenge is the loss of wildlife habitat. To meet these challenges, government and industry researchers continue to monitor the state of Canadian forests and to examine the factors influencing their health. Increasingly, sustainable management practices are followed by forest users in order to restore and protect the environment.

Canada's forests are a precious national treasure. Wise management, practised through cooperation and dialogue, will ensure that they will continue to be a vital part of Canadian life for generations into the future.

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YEAR IN REVIEW

Sustainable management of our forests continued to head the list of priorities for Canada in 2004–2005. The effects of climate change, carbon accounting and greenhouse gas reduction figured strongly in research and technology. Consultation and cooperation are flourishing. Across the country, forest managers, industries, governments, researchers and environmentalists are working together to balance environmental, economic and cultural interests. Aboriginal people are participating in forest industries, collaborating in forest management and lending expertise. Governments, industry and researchers are fighting to reduce the risks of insects and fires and to salvage damaged trees. Many provinces this year added to their conservation areas, and more at-risk species were protected. Educational efforts on good forest management continued, and Canada worked with other countries to promote forest products.

Forest Management

During 2004–2005, several provinces directed their efforts towards forest management to foster the social, environmental and economic well-being of Canadians.

We begin our review in the west. **Saskatchewan** completed a new land use plan for its northeast area in April 2004. The Amisk-Atik Land Use Plan will provide direction for anticipated forestry developments on the area's land and resources. The plan will be reviewed annually and updated every five years to meet the changing needs of the area.

Our Sustainable Future was released by the **Ontario** Ministry of Natural Resources in June 2004. This new strategic directions document will help guide the Ministry of Natural Resources and ensure sustainable development of natural resources and economic prosperity, especially in northern Ontario. It will also strengthen commitment to conserving biodiversity and green space with special emphasis on southern Ontario. The document establishes a dual focus, supporting sustainable resource development and maintaining a strong emphasis on protecting the natural environment. This focus will be supported through stronger policy development and enhanced science, information, assessment and reporting.

Also in June 2004, the **Ontario** Ministry of Natural Resources released the *Forest Management Planning Manual (2004)*. This updated and revised manual provides direction for all aspects of forest management plans scheduled for renewal after March 2007; this applies to management units designated under the *Crown Forest Sustainability Act*.

The Province of **Ontario** released its new Provincial Wood Supply Strategy in June 2004. The strategy identifies critical wood supply issues and provides recommendations for addressing them. Its aim is to sustain a continuous, predictable, long-term wood supply necessary for industrial processing facilities and to increase the level of long-term available wood supply.

The Commission for the Study of Public Forest Management in **Quebec** released its report on December 14, 2004. The report, based on numerous public consultations and including technical reports and assessments by consultants, contains 81 recommendations. The Commission's priorities include a focus on ecosystem-based management and the completion of the protected areas network; the method of evaluating the availability of timber for harvest; more highly targeted silviculture; diversification of the wood processing industry; and integrated, supervised, decentralized and transparent management. The Coulombe Commission, as it is known, has recommended that Quebec adopt management plans for 2008 in keeping with the new management and land use directions. The Quebec government has appointed an associate deputy minister to implement the recommendations of the commission.

On March 22, 2005, the **Quebec** National Assembly adopted Bill 71. In response to the recommendations of the Coulombe Commission, the bill postpones the effective date of the next general forest management plans to April 1, 2008. It also reduces the allowable softwood cut for the next three years by 20 percent. For the area covered by chapter 3 of the *Paix des Braves* agreement, a 25 percent reduction is mandated.

TAMARACK

The series of photos on these pages presents a glimpse of various tree species found in Canada's boreal forest.

During 2004-2005, New Brunswickers have continued their discussion and debate about forest policy. In June 2004, the **New Brunswick** government released the *Forest Management Manual for New Brunswick Crown Land* (interim manual). The Minister has also formally established a Senior Forest Steering Committee, composed of senior department and industry members.

BALSAM FIR

Forest Information

Governments and organizations were busy implementing initiatives and communicating information to help achieve sustainable forest management.

The **Foothills Model Forest** Grizzly Bear Research Program completed its first five-year phase of research. The final report for the first phase was published in 2004. The study looks at grizzly bear habits, health and movements—information that is helping companies identify where to operate within their tenure areas. The findings led to the development of important new management tools such as utilizing remote sensing in the creation of grizzly bear habitat maps for large-scale landscape areas in Alberta.

As there are 450 000 private woodland owners in Canada that collectively manage approximately 20 million hectares of land, the **Canadian Model Forest Network** (CMFN) continues to recognize the importance of this group to sustainable forest management. In September 2004, the CMFN published *Private Woodland Owners—Meeting the Stewardship Challenge*. The publication highlights woodlot-owner contributions to stewardship across Canada and provides background information for further discussion within the woodlot community on current and future challenges.

Forest 2020 Plantation Demonstration and Assessment is part of the federal government's Climate Change Plan for Canada. Through this initiative, a network of plantation demonstration sites has been established across Canada. These are designed to improve plantation information and demonstrate the contribution from fast-growing trees to achieving our Kyoto Protocol greenhouse-gas-emission reduction targets. During the spring and fall of 2004, over 3 000 hectares were planted with fast-growing species (such as hybrid poplar, larch, red pine, Norway spruce). These trees remove carbon dioxide from the atmosphere and store it for many years. Over the past year, a wide range of new information was collected, which will help researchers determine the potential economic and carbon benefits from such plantations. A national economic model has been developed and was used in 2004 to do a nation-wide assessment of the cost and benefits of fast-growing plantations on private lands in Canada. These research results will help Canada evaluate whether to invest in fast-growing plantations for carbon and other benefits, and how best to encourage investment by the private sector.

In July 2004, the **National Roundtable on Environment and the Economy** (NRTEE) released *Boreal Canada: State of the Ecosystem, State of Industry, Emerging Issues and Projections*. This background paper, prepared by Global Forest Watch Canada, describes the state of the boreal ecosystem, including key aspects of its ecology, key threats, and its state of health. It also discusses emerging issues, the relative importance of industry, and future projections. Findings of the paper are being incorporated into an upcoming *State of the Debate* report by the NRTEE on "Securing Canada's Natural Capital in the Boreal Forest," due to be released in the fall of 2005.

International Forest Resources released *Global Environmental Forest Policies: Canada as a Constant Case Comparison of Select Forest Practice Regulations* on July 16, 2004. The **Forest Products Association of Canada** and the **BC Market Outreach Network** commissioned Yale University Professor Ben Cashore to undertake an independent comparison of forest policies in 20 countries around the world. The study emphasizes the importance of further systematic analysis and monitoring of policy implementation, as well as the need for measuring the effectiveness of policies in preventing environmental deterioration.

A Cut Above: A Look at Alternatives to Clearcutting in Canada's Boreal Forest was released in February 2005. The report, authored by a forestry professor of the University of Winnipeg and others on behalf of the **Wildlands League** (a chapter of the Canadian Parks and Wilderness Society), explores ways in which alternatives to traditional clearcut harvesting can support wildlife conservation goals in the boreal forest.

Building on its effort to convene a diverse group of companies, Aboriginal peoples and conservationists to find boreal conservation solutions, the **Canadian Boreal Initiative** released *The*

WHITE SPRUCE

Boreal in the Balance: Securing the Future of Canada's Boreal Region on January 31, 2005. The report examines the status of boreal conservation activities related to land use planning, Aboriginal rights, protected areas, sustainable development and research.

Where Land and Waters Meet: An Assessment of Canada's Riparian Forest Management Standards, a **Global Forest Watch** Canada report, was released in July 2004. This report looks at a vast array of differing standards and policy instruments for the conservation and management of Canada's riparian forests.

In November 2004, **BIOTECanada** launched BioPortal (http://www.biotech.ca), a federal web site that offers government information on biotechnology. The web site contains the latest biotechnology research, activities, strategies, policies and regulations.

The Province of **British Columbia** released its first *State of British Columbia's Forests—2004* on March 10, 2005. The report's content includes statistical information on six indicators of sustainability with an emphasis on issues particularly important to the province. Subsequent editions are expected to cover the full framework of 24 indicators and provide updates on previously presented indicators.

In **New Brunswick**, the all-party legislative committee on wood supply tabled its report in September 2004. Their 25 recommendations fell within four categories: governance and accountability, forest management objectives, allocation of resources and distribution of benefits, and provincial wood supply. The government has solicited opinion from significant stakeholders, other relevant departments, and staff members, and its response is expected early in the next fiscal year.

In the summer of 2004, the Public Forest Council undertook a series of province-wide consultations with **Prince Edward Island**'s Ground Hemlock harvesting and processing industries and with Island landowners, to investigate allegations of trespass, theft and unsustainable harvest practice. Council found these allegations to be based in fact and presented a number of recommendations to government on how to address these issues. Government accepted these recommendations and formed a task force to implement them in 2005.

The Province of **Prince Edward Island** released its "Forest Policy Discussion Paper" to the public on December 3, 2004.

The purpose of this paper is to stimulate public discussion on forest policy for Prince Edward Island. Six critical issues, which have emerged from a review of existing documents, comments and recommendations, are highlighted. The consultation process was completed in spring 2005.

Partnerships and Collaboration

In 2004–2005, stakeholder relationships were important to harness the collective capabilities and expertise to enhance Canada's forest sector.

On September 16, 2004, **British Columbia** and **Yukon** signed a letter of understanding towards an exchange of forest resources to foster economic development and cooperation. This agreement gives B.C. access to high-quality timber just across the Yukon border while Yukon has access to timber from northern B.C. The exchange also serves to develop opportunities in the forest industry for Kaska First Nations.

In 2004, **Manitoba** Conservation identified a potential hardwood-based opportunity for the Interlake and southeastern regions of Manitoba. As of March 2005, a Request for Proposals was released to identify companies interested in partnering with First Nations Limited Partnership (FNLP) on a hardwood-based development. Proposals are due at the end of May. FNLP has been meeting regularly with communities to discuss the progress of this project over the past year.

On November 17, 2004, **Ontario** announced its membership in the Forintek Canada Corp. partnership. Ontario will draw on Forintek's expertise to further its assessment of value-added wood product, bio-energy and bio-product opportunities. Ontario will also benefit from Forintek's ongoing research and technical advice in the wood products sector.

In 2004-2005, in line with **Quebec** government policy in the area of local and regional development, the province's Department of Natural Resources and Wildlife transferred full responsibility for the management of Part II of the Forest Resources Development Program to the regions. The objective of Part II is to fund activities that contribute to the protection and development of forest resources. The regions have broad latitude to establish acceptance criteria and select projects in keeping with regional development priorities and with the general objectives set out by the Minister.

New Brunswick's Minister of Natural Resources sought advice on several fronts with the aim of improving forest activities within the province. In one initiative, department staff facilitated dialogue between the private producers, represented by the New Brunswick Federation of Woodlot Owners, and the New Brunswick Forest Products Association. Discussion focused on issues related to the flow and supply of private wood to the mills and the sustainability of private woodlots. Unfortunately, mutually acceptable recommendations were not arrived at. Dialogue will continue in anticipation of a suitable solution.

Follow-up continued in **New Brunswick** in 2005 on the assessment of licensees' management planning processes conducted in 2004 for the New Brunswick Forest Products Association. The department and licensees continued efforts to identify standardized approaches that will ensure greater consistency between licensees, thus providing a common basis for evaluating forest productivity. Licensees and department staff also continued joint efforts in relation to objective-setting and data preparedness for the development of the 2007-2012 management plans. The release of the Forest Vision for this next planning period was delayed from its December 2004 date pending the government's response to the Select Committee on Wood Supply report. The 2007-2012 Vision was released in spring 2005.

On June 3, 2004, **Nova Scotia**'s Department of Natural Resources entered into a partnership agreement with Forintek Canada Corp. to have them provide technical advice to the wood product manufacturing industry in the province. This will enable the wood industry to receive the most current information on new technology and innovations.

On February 14, 2005, the government of **Prince Edward Island** announced its intention to enter into an agreement with the Environmental Coalition of Prince Edward Island to manage 800 hectares of public forest land. This pilot project is intended to assess new ways of managing public lands and enhance the involvement of these lands in community development.

JACK PINE

Innovation

The forest sector continued to focus on innovation and new technology development to remain competitive and to meet the evolving expectations of forest stewardship.

The **Canadian Model Forest Network** and the **Canadian Forest Service** have joined forces to support the forest management community in assessing the contribution of forest management activities to the reduction of greenhouse gas concentrations in the atmosphere. Over 2004-2005, the two groups worked together to test an operational-scale carbon budget model (CBM-CFS3) that can be used by forest analysts to estimate forest carbon stocks and carbon stock changes, as well as assess the impact that forest operations have on forest carbon stocks. Model training workshops were held across the country and more are planned for the future. A beta version of the model is currently available for training and testing; public release of the model is planned for the fall of 2005.

On February 22, 2005, the **Pulp and Paper Research Institute of Canada** signed a three-year collaborative agreement with NanoQuebec. The two organizations will collaborate in the development of nanotechnology applications in the forestry sector. This technology could transform all aspects of the forest products industry, from production of raw materials to new applications for composite and paper products.

In May 2004, **Forintek Canada Corp.** signed an agreement with Linnet – The Land Systems Company® for the distribution of their new Drylog™ Moisture Model technology. The Model, a product of three years of research at Forintek, is a tool used to predict wood moisture levels and will assist in determining the best storage time for logs. This computer program will benefit the producers of high-value engineered wood products such as oriented strandboard (OSB).

The **Forest Engineering Research Institute of Canada (FERIC)** and **FOR@C (Université Laval)** have developed a Virtual Transport Manager (VTM) system, a practical way to manage vehicle dispatch on a regional basis using Internet technologies. The model construction was completed in 2004; the development phase and technology transfer are scheduled for completion over the next three years. The VTM will help reduce transportation costs by better route scheduling and vehicle utilization and will also help reduce greenhouse gas emissions.

On March 24, 2005, the government of **Alberta** announced a three-year, $33-million Innovation Program. The program is intended to support the Province's Strategic Plan by encouraging innovation within the government of Alberta through innovative technologies and excellence of service. The program will support successful proposals from across the province's government organizations in the areas of energy, health, information technologies and forestry.

New Brunswick completed final touches to two systems, e-Silviculture and Nursery Seedling Inventory; both systems will become operational in the new fiscal year. The e-Silviculture, an Internet-based application, allows departmental head offices, regional offices and licensees to access silviculture data combined with geographic information. The nursery system does not have direct-user access, but provides significant improvements in managing crop information, including seed source, stock age, growth and client destination.

Research

In 2004-2005, Canada invested in research that will help make this country a world leader in forestry.

On December 15, 2004, the Government of Canada announced the funding of two new **Industrial Research Chairs** in the Department of Chemistry at McGill University through a partnership with the Pulp and Paper Research Institute of Canada. The research aims to improve the papermaking process in order to enhance the competitiveness of the pulp and paper industry and reduce its environmental impact. The first new Chair, held by Dr. Theo van de Ven, will focus on the chemistry of paper while it is being formed and still wet; the other Chair, held by Dr. Derek Gray, will focus on the properties and uses of wood pulp fibres.

On November 2, 2004, the Government of Canada announced its financial support for the establishment of the first **Canada Research Chair** at Algoma University College in Sault Ste. Marie, Ontario. The Chair, held by Dr. Jenny Cory, will focus its research on pest control in forestry and agriculture in Canada and worldwide.

An **NSERC-Université Laval Industrial Research Chair** in silviculture and wildlife was launched on March 17, 2005. The purpose of the research Chair, held by Jean-Claude Ruel, is to develop silviculture systems adapted to the characteristics of the boreal forest, which consists of uneven-aged stands. The research will be carried out in Quebec's North Shore region.

The **Industrial Chair on Engineered Wood Products for Structural and Appearance Applications** was officially announced on November 26, 2004. The objective of the Chair, which is held by Dr. Robert Beauregard and affiliated with Universite Laval's Department of Wood and Forest Science, is to improve the competitiveness of the wood products industry through the development of innovative products, manufacturing processes and business models.

Environment

Governments, associations, organizations and industry—recognizing the importance of the environment—contributed to the safeguarding of Canada's forests in various ways.

Canada is developing a **National Forest Carbon Monitoring, Accounting and Reporting System** (NFCMARS) to assess and report carbon stocks and stock changes in forests across the country. The system integrates forest information such as forest inventories, growth and yield, land use change, and disturbance statistics from various sources into a modelling framework, using the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS). By bringing together the best available information and scientific understanding of the ecological processes involved in forest carbon cycling, NFCMARS is being used to improve our understanding of the role of Canada's forests in the global carbon cycle, and will also be used to address the forest reporting requirements of the Kyoto Protocol and the United Nations Framework Convention on Climate Change.

On February 7, 2005, the **Forest Products Association of Canada** and **Environment Canada** announced the establishment of the Pulp and Paper Air Quality Forum. The Forum is composed of a group of key decision makers from industry, federal and provincial governments, non-governmental organizations, Aboriginal peoples and environmental communities. The purpose of the Forum is to collectively design and recommend a proactive, innovative 10-year plan for the management of pulp and paper emissions.

Alberta's Boreal Region has been selected as the 2005 **FOREST CAPITAL OF CANADA**. Every year the Canadian Forestry Association (CFA) designates a community or region to host a celebration of its past and ongoing ties to the forest. This program focuses on making Canadians aware of the importance of protection and wise use of forest, water and wildlife resources.

From 2003 to 2005 the **Tree Canada Foundation**, under its *Grow Clean Air* program, planted over 20 000 trees; this included plantings for three companies and nine conferences in 2004-2005 alone. The program was established to offset the carbon dioxide emissions produced by companies and organizations and during conferences through the planting of trees (afforestation), since trees absorb carbon. Using the calculator in the climate change program (http://www.growcleanair.ca/calculator), the Foundation is able to calculate the number of trees needed to offset the amount of carbon generated (through travel, heating, lights, etc.).

The government of **British Columbia** introduced "Standards for Seed Use" to protect the province's tree gene resources. As of April 1, 2005, the standards apply to anyone planting trees in order to establish a free-growing stand under the *Forest and Range Practices Act*.

In August 2004, **Alberta** amended Weyerhaeuser's Grande Prairie Forest Management Agreement (FMA) to allow C&C Wood Products of Quesnel, B.C., to proceed with the purchase of Weyerhaeuser's Grande Cache plant. The amendment included removing one of the forest management units from Weyerhaeuser's FMA and reducing the available annual allowable cut in the area assigned to C&C Wood Products to allow for greater consideration of wildlife management strategies.

Approximately 3.5 million new trees were added to **Saskatchewan**'s northern forests in spring 2004. The planting is part of the province's Department of Environment reforestation projects. An additional 15.3 million seedlings were planted through the forest companies' reforestation programs.

In **Nova Scotia**, the Voluntary Planning Board—an organization that enables the province's residents to provide advice directly to senior government officials—released the *Final Report of the Voluntary Planning Off-highway Vehicle Task Force* on November 2, 2004. Since spring 2003, a team of volunteers knowledgeable on the central issues have conducted inclusive and extensive public consultations. The report makes 39 recommendations, which focus on enforcement, infrastructure, safety, protection of property, appropriate designation of trails, and uniform standards for off-highway vehicles in Nova Scotia. One of the recommendations is that protected wilderness areas and sensitive ecosystems be off limits to off-highway vehicles to avoid the damage caused by these machines.

BEBB WILLOW

Conservation and Protection

Most provinces pursued their commitment to conserving and protecting natural areas across the landscape to help maintain biodiversity.

The government of **Yukon** officially established the Tombstone Territorial Park on October 25, 2004. An overall management plan for the park is now being planned.

The Province of **Saskatchewan** protected 32 500 hectares within the boreal plain ecozone and 35 382 hectares of land near the town of Hudson Bay in 2004. These lands were added to the Representative Areas Network, increasing it to 9 percent of the province's land and water base. The province is committed to protecting 12 percent of its land as part of the network.

The government of **Saskatchewan** released its Biodiversity Action Plan in May 2004. This five-year action plan will guide the conservation actions of all government sectors until the end of 2009. The plan complements the Canadian Biodiversity Strategy. An agreement to help conserve the province's biodiversity was signed on February 18, 2005, between Saskatchewan Environment and the Saskatchewan Wildlife Federation. This five-year "Habitat Securement Agreement" will ensure that natural ecosystems and native habitat are secure.

In November 2004, the government of **Manitoba** designated an additional rare river-bottom forest in the Red River Valley as the province's 18th ecological reserve. This new reserve became a protected site within the network of protected areas in Manitoba. The site is unique in that its many plant species must possess a tolerance of this flood-prone environment in order to survive.

On December 3, 2004, the government of **Manitoba** announced the formation of a new provincial park. The Manigotagan Provincial Park will ensure that the Manigotagan River's water quality; natural splendour and cultural and recreational values will be preserved for generations to come. Furthermore, the new park will recognize and respect treaty rights and the goals and values of regional communities.

The **Ontario** government launched a major review of its legislation governing provincial parks, conservation reserves and wilderness areas in September 2004. Ontario has 316 parks, 249 conservation reserves and 10 wilderness areas. The province's system of parks and protected areas welcomes more than 10 million visitors a year from within Ontario and around the world.

In April 2004 the **Ontario** government added protection for four more species at risk. The four newly regulated plant species are the Western Silvery Aster, False Hop Sedge, Skinner's Agalinis and Virginia Goat's-rue. These plant species are found in only 11 known locations in Ontario, and are at risk of extinction. With the addition of these four, 40 plant and animal species are now regulated under Ontario's *Endangered Species Act*. The act prohibits harming of regulated species or their habitats.

In May 2004 the **Ontario** government protected the Eastern Wolf by banning the hunting, trapping and chasing of wolves and coyotes in and around Algonquin Provincial Park. The park is the largest protected area for the Eastern Wolf in North America. In March 2005 Ontario also introduced a new closed season for hunting and trapping wolves in central and northern Ontario.

In February 2005 the government of **Ontario** passed the *Greenbelt Act 2005*, which will permanently protect more than 400 000 hectares in the Golden Horseshoe area of southern Ontario. The newly protected area will be added to the protected areas of the Oak Ridges Moraine and the Niagara Escarpment to form a 730 000-hectare greenbelt area of environmentally sensitive and agricultural land.

In April 2004, the Province of **Ontario** transferred 1 432 hectares of Crown land to Rouge Park in Toronto. With this expansion, the park becomes the largest natural park in an urban area in North America.

The **Ontario** government announced in December 2004 that it will help protect Ontario's natural heritage through stronger property tax relief for landowners and conservation groups. The government is encouraging conservation by enhancing two programs, the Conservation Land Tax Incentive Program and the Managed Forest Tax Incentive Program.

In June 2004, the **Quebec** government announced the creation of eight new protected areas that are now off limits to all forestry, mining and energy development. In all, 5.4 percent of the total area of Quebec is now set aside as protected areas.

TREMBLING ASPEN

The **Quebec** Minister of Natural Resources and Wildlife announced 11 new public forest resources protection and development objectives that will be integrated into the next general forest management plans. The objectives are legal and contractual obligations. They will contribute to biodiversity conservation and soil, water and landscape protection and will help to ensure that the needs and values expressed by communities and users of forests are taken into account.

In 2004-2005, the government of **Nova Scotia** protected more wilderness areas. These areas can now be used for research and recreation activities. As of March 2005, Nova Scotia has 33 wilderness areas, totalling more than 294 000 hectares, under the *Wilderness Areas Protection Act*.

Certification

Efforts continued towards achieving consensus on forest management practices.

In December 2004, the **Forest Products Association of Canada** announced that member companies are seeking Environmental Choice™ Program or EcoLogo™ certification for their cogeneration (combined heat and power generation) sites that use biomass (renewable energy derived from products such as bark, wood shavings, sawdust and spent pulping liquor). EcoLogo certification is a comprehensive national program sponsored by Environment Canada to recognize manufacturers and suppliers that produce products and services that are more environmentally responsible.

The **British Columbia** Forest Safety Council and the Workers' Compensation Board implemented the BC Faller Training Standard and Certification Program in fall 2004 to improve safety in the forests. The program will include mandatory testing and will require a skills demonstration by experienced fallers. Fallers must be certified by July 31, 2005.

The Province of **Ontario** is moving to require that all forest industry Sustainable Forest Licence holders be certified to an accepted performance standard by the end of 2007. A Sustainable Forest Licence allows the holder to engage in forest management in the province. Licence holders are required to carry out a range of activities necessary to ensure the sustainability of the Crown

CANADIAN FOREST MANAGEMENT CERTIFICATION STATUS

According to the April 11, 2005 Coalition certification status report, 151 million hectares of forest land across the country, representing an annual allowable cut of approximately 133 million cubic metres, have been certified, if all certifications to ISO, CSA, SFI and FSC are included. Otherwise, certifications to SFM standards including CSA, SFI and FSC come to approximately 104.6 million hectares of forest land, representing an annual allowable cut of almost 91 million cubic metres.

STANDARD USED	AREA CERTIFIED (in hectares)
ISO 14001 *International Organization for Standardization* Worldwide most recognized Environmental Management System Standard, helping organizations to better manage the impact of their activities on the environment and to demonstrate sound environmental management.	137.9 million
CSA *The Canadian Standards Association–* *Canada's National Sustainable Forest Management Standards* Based on nationally and internationally recognized criteria for sustainable forest management. Addresses environmental, social and economic issues and requires a rigorous public participation.	63.7 million
SFI *Sustainable Forestry Initiative Program–* *developed by the American Forestry & Paper Association* Includes environmental objectives and performance measures and integrates the growing and harvesting of trees with the protection of wildlife, plants, and soil and water quality, along with other conservation goals.	36.8 million
FSC *Forest Stewardship Council* Supports environmentally appropriate, socially beneficial and economically viable management of the world's forests. Also supports the development of national and regional standards.	4.9 million

Source: Canadian Sustainable Forestry Certification Coalition (http://www.sfms.com)

Note: If a forest area has been certified to more than one of the three SFM standards (CSA, FSC and SFI), the area is only counted once; hence the total of certifications for SFM standards may be less than the sum of the individual totals for these standards.

forests in the licence area. The government's intent in requiring certification is to help ensure the Ontario forest industry is given preference in export markets, and to contribute to a more innovative and thriving economy.

Outreach

Activities involving the general public were organized to increase awareness and understanding of the forests.

Girl Guides of Canada, Scouts Canada and the **Canadian Model Forest Network** have partnered to design a Model Forest Challenge Crest that Guides and Scouts may earn. There are two versions of the Model Forest Challenge, the junior version and the senior. The purpose of this challenge is to learn about sustainable forest management and the work being done in this area by the Canadian Model Forest Network.

In 2004, the **Manitoba Model Forest**'s Eastern Region Woodland Caribou Advisory Committee released its new educational video, *Shadows of the Forest: Managing Woodland Caribou*. The 25-minute video tells the story of Manitoba's Woodland Caribou, a threatened species, and the work being done to understand and protect their habitat. In addition to discussing some of the factors that make it a species at risk, the video reviews Manitoba Model Forest research activities, including state-of-the-art tracking and computer mapping undertaken by the Eastern Region Woodland Caribou Advisory Committee.

In May 2004, Tembec signed a three-year agreement with the **Tree Canada Foundation** to create the Tembec Green Schoolyard Program. Selected schools across Canada will benefit by having trees and shrubs planted for carbon sequestration, environmental and educational purposes. In November 2004, the Tree Canada Foundation launched a newly redesigned Green Streets Canada Program to encourage innovative practices and policies in urban forest management.

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ForestLeadership, a new initiative aimed at developing leadership to promote sustainable forestry, was announced in April 2004. The organization will focus on conferences, professional training, forward-looking information tools, annual awards and career development. It will work towards engaging key sustainable forestry groups. ForestLeadership held its first conference in March 2005.

WHITE BIRCH

Aboriginal Involvement

Initiatives were put in place throughout the year to improve the economic and social well-being of Aboriginal people.

In January 2005, the **Government of Canada** announced its economic support for the Chipewyan Prairie and Heart Lake First Nations of northeastern Alberta to participate in the forestry industry. Janvier/Heart Lake Forestry Inc., a joint partnership of the Chipewyan Prairie and Heart Lakes First Nations, was formed and entered into a five-year harvesting agreement for Alberta-Pacific Forest Industries Inc.

As part of Phase III of Canada's Model Forest Program, the Special Project Areas initiative will transfer knowledge and technology from Model Forests to three new Special Project Areas, which have joined the Canadian Model Forest Network (CMFN). The **Western Newfoundland Model Forest** facilitated the development of a Special Project Area involving the Innu Nation of Labrador and the government of Newfoundland and Labrador. Labrador's forests have been home to the Innu people for thousands of years; the Innu are now actively involved in a unique partnership with the province to provide direction for the Strategic Forest Management Plan for District 19, a 2.27 million hectare area in Labrador. Their three-year project is to develop a site classification manual for Labrador/Nitassinan that incorporates biophysical knowledge, such as information on soils, key plant indicators and successional patterns, with traditional and cultural Innu values.

Reallocation of long-term replaceable logging rights held by major licensees to First Nations, woodlots, community forests and new entrepreneurs continued in 2004–2005 in **British Columbia**. Since September 2002, government has signed agreements with 85 First Nations, providing a total of almost $85 million and 13 million cubic metres of timber over the terms of the agreements.

A memorandum of understanding was signed on April 22, 2004, between the Province of **Manitoba** and eight First Nations located within the East Side of Lake Winnipeg. This agreement will ensure the participation of First Nations people from the east side in land use decisions affecting their communities and traditional territories.

The East Side Planning Initiative presented its status report, *Promises to Keep*, on the development of a Broad Area Plan for the east side of Lake Winnipeg to **Manitoba**'s Minister of Conservation on November 16, 2004. The objective of the east side planning process is to bring together local communities, First Nations, industry and environmental organizations to develop a vision for land and resource use in the area that respects both the value of the boreal forest and the needs of local communities. The report provides 102 recommendations on matters of importance to the residents of the east side of Lake Winnipeg. To address some of these recommendations, the government of Manitoba established the East Side First Nations Council.

The **Manitoba** Forestry Branch held discussions with the Swampy Cree Tribal Council in the fall of 2004 regarding a partnership in a field sampling program to assess timber volume. The program, which started in October 2004, is linked to the provincial mandate of increasing First Nations' involvement in forestry in the province of Manitoba.

On September 27, 2004, the **New Brunswick** Aboriginal Forestry Initiative was approved for funding through the Aboriginal Skills and Employment Partnership program. The five-year program was launched in October 2003 to create sustainable employment for Aboriginal people in major economic initiatives such as forestry.

The government of **Newfoundland and Labrador** and the Labrador Metis Nation (LMN) have entered into an agreement that defines how the LMN will participate in forest ecosystem management planning in Labrador. The two-year agreement, which runs from April 1, 2004, to March 31, 2006, formally defines the role of the LMN in the management and future development of Labrador's forest resource. The LMN will create management plans in partnership with other forest stakeholders to address such issues as the conservation of wildlife, the natural environment, culture and tradition.

International Activities

Canada continued its involvement with international activities to enhance cooperation and coordination on forest issues as well as to increase market access.

The **International Model Forest Network** launched Europe's first model forest on September 1, 2004. The Vilhelmina Model Forest is situated in northern Sweden's Västerbotten county and covers 120 000 hectares. Its main objective will be sustainable forestry development and the conservation of biological diversity.

In March 2005, the **McGregor Model Forest** received funding from the Canadian International Development Agency and the Russian government to continue its work in the Russian Far East state of Khabarovsk. This collaborative project brings together the model forest staff and partners at the College of New Caledonia (CNC) and the University of Northern British Columbia (UNBC). Model Forest staff will provide project management and administration. Instructors from CNC will train key state-level teachers in the technology of wood-frame building construction and entrepreneurial development. Instructors from UNBC will provide training in local governance.

During the summer of 2004, the Chinese Ministry of Construction released its "Chinese Timber Structural Design Building Code" (GB5005). A chapter on North American-style wood-frame construction is featured in the document. Implementation of this national code will allow the construction of North American wood-frame houses using Canadian products, grading rules and design properties. **Canada Wood** and the **Shanghai Municipal Government** signed a memorandum of understanding in January 2005 aimed at developing local Shanghai building codes. These codes will draw from the national code and will strive to create standards and guidelines for using wood-frame construction techniques targeted at low-rise, multi-use buildings in Shanghai, China's fastest-growing market.

British Columbia's Dream Home China demonstration centre was officially opened on January 25, 2005. Situated in Shanghai, China, the centre will showcase B.C. forest products and wood-frame construction for Chinese consumers, developers, architects, builders and government officials and will also serve as an office for B.C. forest associations operating in China. The five-year project (announced in April 2003) is a partnership between the government of B.C. and the B.C. forest industry.

BALSAM POPLAR

Natural Disturbances

The country pursued its commitment to help develop prevention, detection, response and management systems to address natural disturbances.

An **Invasive Alien Species Strategy for Canada** was approved and released in September 2004. The Strategy represents the collective efforts of several federal government departments and agencies as well as numerous provinces. It seeks to establish a framework that minimizes the risk of invasive alien species to the economy, environment and society. Three action plans were developed, focusing on prevention, detection, response and management: 1) Aquatic Invasive Species, 2) Terrestrial Invasive Plant and Plant Pests, and 3) Terrestrial Invasive Animals and Wildlife Diseases.

The federal government's **Mountain Pine Beetle Initiative** (MPBI) is a six-year, $40-million package of programs administered by Natural Resources Canada. The Initiative objectives are to reduce the impacts of the current mountain pine beetle epidemic and to reduce the risk of future outbreaks. To date the cost-shared private forest-lands program has provided assistance to 124 forest-land owners. In **British Columbia** and **Alberta**, 57 First Nations bands have received financial and technical assistance to control, manage and rehabilitate infested forest lands. Besides the ongoing threat to forests in B.C., the beetle is a threat to pine forests in Alberta and the boreal. MPBI research under way is focused on detection, mapping, outbreak prediction, post-beetle regeneration, reducing infestation risk, and the impacts on communities, forest ecology and established markets. Details are available at the Initiative web site: http://mpb.cfs.nrcan.gc.ca/index_e.html.

In the **Yukon**, 2004 was a record-breaking year for forest fires, which burned 1.82 million hectares of forest, almost 60 percent of the Canadian total. Subsequently, the Yukon government initiated an independent review of the 2004 wildland fire season. The review team examined the nature of wildland fires in Yukon, the management of the territory's fires and the 2004 season in particular. The final report was presented to the government in spring 2005.

In April 2004, the **British Columbia** government updated its mountain pine beetle action plan and announced the creation of a two-year Bark Beetle Task Force to oversee the implementation of the plan. An advisory group will represent communities,

BLACK SPRUCE

First Nations, forest industry, the scientific community and the federal government. One of the goals of the action plan is creating new markets for beetle-damaged wood (e.g., developing tenure opportunities). The introduction in October 2004 of Bill 65 will also help to salvage the beetle wood: the B.C. government is now able to specify an area of Crown land as a mountain pine beetle salvage area, and specify requirements under a forest licence competitively sold within the salvage area.

The implementation of the recommendations from the Filmon Fire Review began in **British Columbia** in 2004. Cranbrook and Logan Lake were selected as pilot projects for interface management to protect people and property from the threat of wildfire. Five new unit crews were put in place, as well as two more air tankers.

On March 18, 2005, the governments of **Alberta** and **British Columbia** signed an agreement to share the work and costs of fighting the spread of mountain pine beetle threatening both provinces. The first action under the agreement involves the cutting and burning of infested trees in the Peace Forest District of B.C.

In December 2004, the government of **Nova Scotia** put forward an enhanced wood salvage program for landowners within the Brown Spruce Longhorn Beetle restricted zone. The program is meant to salvage areas where damage is most extensive and reduce public safety risks while supporting efforts to contain and eradicate the beetle.

Economic Issues

During 2004–2005, Canada established mechanisms to encourage sustainable economic development opportunities in the forest industry.

Canada continues its efforts to find a resolution to the **softwood lumber dispute**. In December 2004, as a result of the first annual review of the countervailing and anti-dumping duties, the United States reduced the combined duty rate by more than 7 percent. Between May and December 2004, the U.S. had collected combined duties of 27.22 percent on softwood lumber; currently, Canadian softwood lumber exports are subject to duties of 20.15 percent. It is estimated that Canada's cash deposits total approximately $4.6 billion. Canada remains committed to a two-track strategy for resolving the dispute: litigation, and negotiations towards a long-term, policy-based solution. While Canada has been largely successful in its legal challenges and NAFTA and WTO panels have repeatedly ruled that the U.S. duties are unjustified, the United States has not complied with panel decisions. The U.S. has requested establishment of an Extraordinary Challenge Committee (ECC) to review the actions of the NAFTA injury panel.

Funding for the Northern Forest Diversification Centre in **Manitoba** has been confirmed for three years. The Centre will continue its work to link the growing demand for non-timber forest products with the need to create sustainable economic development opportunities for residents of remote communities.

For the past 12 years, **Manitoba** Forestry Branch has auctioned an average of 4 000 cubic metres of timber per year. In the last two years, the timber auction process was expanded to an average of 48 000 cubic metres per year. While auction volumes may not remain as high in future years, Manitoba Forestry Branch will continue to advertise auctions throughout Manitoba.

The **Ontario** government established the Minister's Council on Forest Sector Competitiveness in November 2004. To help strengthen Ontario's forest industry, the 17 council members will provide recommendations to the Minister of Natural Resources on ways to secure a stronger future for the forest products industry, for workers and for northern communities.

In November 2004, the **Quebec** Department of Natural Resources and Wildlife announced that it will provide financial assistance to Temlam Inc. to convert the former Scierie Amos Ltée sawmill into a manufacturing plant for laminated veneer lumber, making it a world-class production facility.

MERGERS AND ACQUISITIONS AND MILL CLOSURES in the Forest Sector

The rapid pace of mergers and acquisitions in the forest sector in previous years has not slowed in 2004-2005. Most of the transactions are occurring in western Canada as mills attempt to increase production efficiencies and reduce costs in order to compete in the global market. Most notable are the acquisitions of Riverside Forest Products by Tolko Industries Ltd., of Weyerhaeuser Company (BC Coastal Group) by Brascan Corporation, and of Weldwood of Canada by West Fraser Timber Co. Ltd. These purchases have reshaped the industry in the interior and coastal regions of British Columbia.

The past year has also seen a trend of mill closures in Canada. A number of factors have had an impact on the profitability of forest product companies and have sparked structural changes in the industry. These factors include the U.S. softwood lumber dispute, a higher Canadian dollar, increasing energy costs (particularly in Ontario), higher delivered wood costs, and increased competition from offshore producers.

Higher delivered wood costs and increasing energy costs are having a significant impact on forest products producers in eastern Canada. In 2005, delivered fibre costs for softwood pulp (chips and roundwood) are 60 percent higher in eastern Canada than in western Canada. Delivered wood costs in Ontario and Quebec continue to rise due to regional shortages of fibre. This trend will continue as governments reduce annual allowable cut levels, as they have already done for Quebec.

For some time, mills in Ontario have been protected from increases in energy costs through provincial price protection measures such as electricity rate contracts. However, these protection measures have been eliminated by recent legislation and, in the last year, electricity prices in Ontario have increased by over 30 percent.

CANADIAN MILL CLOSURES (September 2004 to May 2005)

EFFECTIVE DATE	COMPANY	LOCATION	PRODUCT/CAPACITY PER YEAR
Sept. 2004	UPM-Kymmene (pulp line)	Miramichi, N.B.	• softwood kraft pulp/100 000 tonnes
Sept. 2004	St. Anne-Nackawick	Nackawick, N.B.	• bleached hardwood kraft pulp for high-quality photo paper/251 000 tonnes
Oct. 2004	Port Alice Specialty Cellulose Mill	Port Alice, B.C.	• pulp/160 000 tonnes
Dec. 2004	Domtar (partial mill closure)	Cornwall Pulp Mill, Ont.	• bleached hardwood kraft pulp/150 000 tonnes • paper production/85 000 tonnes
Dec. 2004	Abitibi-Consolidated	Port Alfred, Que.	• newsprint/282 000 tonnes • other paper/36 000 tonnes
Jan. 2005	Tembec Kapuskasing Mill (shutdown of a machine)	Kapuskasing, Ont.	• paper machine/75 000 tonnes
Feb. 2005	NorskeCanada	Port Alberni, B.C.	• paper machine/140 000 tonnes
March 2005	Tembec Opasatika Mill	Opasatika, Ont.	• spruce-pine-fir lumber/95 000 thousand feet board measure
March 2005	Domtar	Chapleau, Ont.	• spruce-pine-fir lumber/90 000 thousand feet board measure
March 2005	Neenah Paper	Terrace Bay, Ont.	• pulp/125 000 tonnes
May 2005	Marks Lumber Ltd. (Tembec)	Brantford, Ont.	• spruce-pine-fir lumber/50 000 thousand feet board measure
May 2005	Saint-Raymond (Tembec)	Saint-Léonard-de-Portneuf, Que.	• Hi-Brite paper/68 000 tonnes
May 2005	La Sarre (Tembec)	La Sarre, Que.	• SPF lumber
May 2005	Norampac Inc.	Montréal, Que.	• Corrugating mill

MERGERS AND ACQUISITIONS IN THE FOREST SECTOR (June 2004 to May 2005)

DATE	COMPANY MAKING THE ACQUISITION	COMPANY/OPERATION SOLD	ACTION	FINANCES	DETAILS OF ACTION
June 2004	Norbord Inc.	Agglo NV, Genk, Belgium	Sale	US $60 million	• 1 oriented strand board and particleboard mill
July 2004	West Fraser Timber Co. Ltd.	Weldwood of Canada from International Paper Company, B.C. and Alta.	Sale	$1.26 billion	• 7 sawmills • 2 plywood plants • 1 laminated veneer lumber plant • 2 pulp mills
Aug. 2004	Ainsworth Lumber Co. Ltd.	Potlatch Corporations, Northern Minnesota, U.S.A.	Sale	US $457.5 million	• 3 oriented strand board mills • 12 megawatt co-generation plants
Oct. 2004 (subject to Competition Bureau approval)	Tolko Industries Ltd.	Riverside Forest Products Limited, B.C.	Sale	$340 million	• 6 sawmills • 2 plywood plants • 1 veneer plant • a remanufacturing facility • whole log chipping facilities • a tie treating and processing facility • a seedling nursery
Nov. 2004	Uniforêt Inc.	Uniforêt Scierie-Pâte Inc., Foresterie Port-Cartier Inc. and 3735061 Canada Inc., Que.	Merger		• 1 sawmill
Nov. 2004	Mercer International Inc.	Celgar Pulp Company, B.C.	Sale	US $210 million	• 1 pulp mill
Dec. 2004	Pope & Talbot Ltd.	Canfor–Fort St. James Sawmill Division, Fort St. James, B.C.	Sale	$39 million plus the value of inventory	• 1 sawmill
Feb. 2005	Brascan Corporation	Weyerhaeuser Company, BC Coastal Group	Sale	$1.2 billion plus working capital	• 5 sawmills • 2 remanufacturing facilities
Feb. 2005	Cambium Group	Bowater, Degelis, Que.	Sale	undisclosed	• 1 treating plant
March 2005	Springer Creek Forest Products Ltd.	Canfor–Slocan Sawmill, B.C.	Sale	$6.2 million plus the value of inventory	• 1 sawmill
April 2005	International Forest Products Limited	Floragon Forest Products Mollalla Inc., U.S. Pacific Northwest	Sale	US $50 million plus inventories	• 1 sawmill

PROFILES ACROSS THE NATION

CANADA

Population (2005)
32.1 million

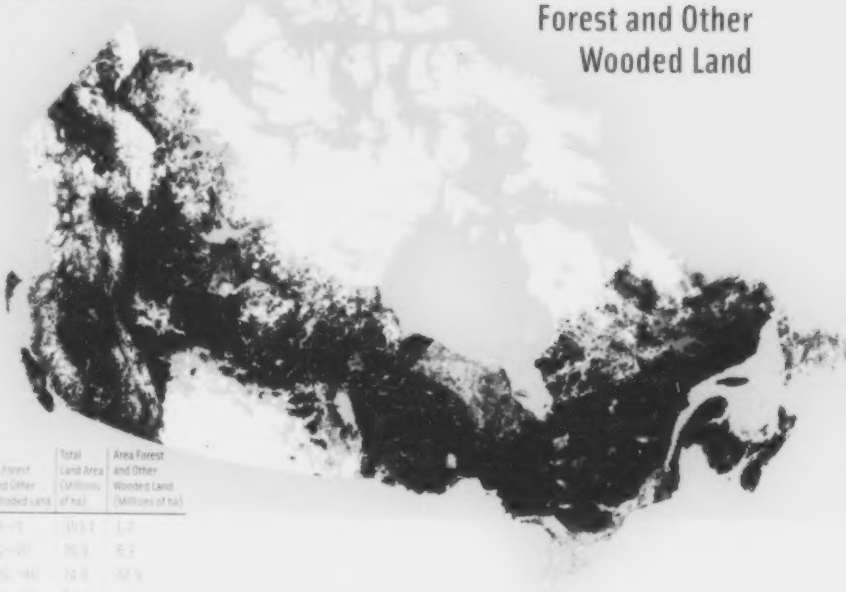
Land area
979.1 million ha

Forest and other wooded land
402.1 million ha

National parks (2004)
26.5 million ha

Park attendance (2004)
16.0 million person-visits

MAPLE TREE



Forest and Other Wooded Land

	% Forest and Other Wooded Land	Total Land Area (Millions of ha)	Area Forest and Other Wooded Land (Millions of ha)
	0–5	103.1	1.2
▨	5–20	76.9	6.3
▨	20–40	72.8	22.9
■	40–60	52.6	31.7
■	60–80	121.8	86.9
■	80–100	290.3	241.7
	Total	979.1	402.1

RESOURCES

Ownership (2004)	
Provincial	77%
Federal	16%
Private	7%
Forest type (2004)	
Softwood	66%
Hardwood	12%
Mixedwood	22%
Potential harvest (2003)	238.8 million m^3
Harvest (volume) – Industrial roundwood (2002)	193.7 million m^3
Harvest (area) – Industrial roundwood (2002)	974 472 ha
Area planted (2002)	427 051 ha
Area seeded (2002)	18 906 ha
Area defoliated by insects and beetle-killed trees (2003)	19.2 million ha
Number of fires (2004)	6 634
Area burned (2004)	3.3 million ha

MAJOR VALUE-ADDED WOOD PRODUCTS

Value of shipments (2003)	$5.5 billion
Doors and windows	$2.1 billion
Framing products	$1.5 billion
Prefabricated buildings	$797.8 million
Mobile homes	$387.1 million
Other products	$772.2 million

NON-TIMBER FOREST PRODUCTS

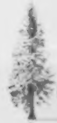
Production	Value	Quantity
Maple products (2004)	$151.9 million	26.9 million litres
Christmas trees (2003)*	$64.1 million	4.1 million
Wildlife pelts (minus sealskins) (2002)	$23.4 milion	889 000

INDUSTRY

Value of exports (2004)	$44.6 billion
Softwood lumber	24.71%
Newsprint	11.91%
Wood pulp	16.02%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	13.22%
Other paper and paperboard	16.23%
Converted paper	2.15%
Other products	15.76%
Major export markets (2004)	$44.6 billion
United States	80%
European Union	6%
Japan	5%
China	3%
South and Central America	1%
Other countries	6%
Balance of trade (2004)	$34.5 billion
Contribution to GDP (2004)	$35.9 billion
Value of shipments	not available
Exported	not available
Sold domestically	not available
Number of establishments	not available
Logging	not available
Wood product manufacturing (2003)	3 747
Paper manufacturing (2003)	870
Direct jobs (2004)	361 100
Indirect and induced jobs (2004)	555 100
Wages and salaries	not available
Logging	not available
Wood product manufacturing (2003)	$5.2 billion
Paper manufacturing (2003)	$5.3 billion
New investments (2004)	$3.1 billion

see page 39
*Based on estimates.
Numbers for sealskins are estimates based on the last five years' data.

BRITISH COLUMBIA



WESTERN RED CEDAR

Population (2005)	4.2 million
Land area	94.55 million ha
Forest and other wooded land	64.25 million ha
Provincial parks	10.3 million ha

RESOURCES

Ownership (2004)	
Provincial	96%
Federal	1%
Private	3%
Forest type (2004)	
Softwood	82%
Hardwood	5%
Mixedwood	13%
Potential harvest (2003)	83.7 million m^3
Harvest (volume) – Industrial roundwood (2003)	65.4 million m^3
Harvest (area) – Industrial roundwood (2002)	189 277 ha
Area planted (2002)	155 405 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)	7.6 million ha
Number of fires (2004)	2 381
Area burned (2004)	222 209 ha

INDUSTRY

Value of exports (2004)	$14.7 billion
Softwood lumber	46.91%
Newsprint	4.14%
Wood pulp	20.25%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	9.36%
Other paper and paperboard	8.36%
Converted paper	0.13%
Other products	10.85%
Major export markets (2004)	$14.7 billion
United States	64.37%
European Union	7.20%
Japan	13.69%
China	4.94%
South and Central America	1.13%
Other countries	8.67%
Balance of trade (2004)	$13.3 billion
Value of shipments	not available
Logging	not available
Wood product manufacturing (2003)	$10.3 billion
Paper manufacturing (2003)	$5.6 billion
Number of establishments	not available
Logging	not available
Wood product manufacturing (2003)	911
Paper manufacturing (2003)	83
Direct jobs (2004)	79 800
Wages and salaries	not available
Logging	not available
Wood product manufacturing (2003)	$1.7 billion
Paper manufacturing (2003)	$868.2 million
New investments (2004)	$0.8 billion

ALBERTA

LODGEPOLE PINE

Population (2005)	3.2 million
Land area	65.44 million ha
Forest and other wooded land	36.39 million ha
Provincial parks	210 550 ha

RESOURCES

Ownership (2004)	
Provincial	89%
Federal	8%
Private	3%
Forest type (2004)	
Softwood	50%
Hardwood	32%
Mixedwood	18%
Potential harvest (2003)	26.9 million m^3
Harvest (volume) – Industrial roundwood (2003)	24.2 million m^3
Harvest (area) – Industrial roundwood (2002)	68 430 ha
Area planted (2002)	38 270
Area seeded (2002)	1 450
Area defoliated by insects and beetle-killed trees (2003)	5.8 million ha
Number of fires (2004)	1 597
Area burned (2004)	234 748 ha

INDUSTRY

Value of exports (2004)	$3.4 billion
Softwood lumber	21.65%
Newsprint	3.85%
Wood pulp	36.22%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	31.15%
Other paper and paperboard	0.98%
Converted paper	0.65%
Other products	5.50%
Major export markets (2004)	$3.4 billion
United States	76.21%
European Union	3.32%
Japan	7.32%
China	5.31%
South and Central America	0.01%
Other countries	7.83%
Balance of trade (2004)	$3.1 billion
Value of shipments	not available
Logging	not available
Wood product manufacturing (2003)	$3.0 billion
Paper manufacturing (2003)	$1.6 billion
Number of establishments	not available
Logging	not available
Wood product manufacturing (2003)	284
Paper manufacturing (2003)	34
Direct jobs (2004)	22 900
Wages and salaries	not available
Logging	not available
Wood product manufacturing (2003)	$520.5 million
Paper manufacturing (2003)	$210.5 million
New investments (2004)	$0.3 billion

PROFILES ACROSS THE NATION

CANADA

Population (2005)
32.1 million

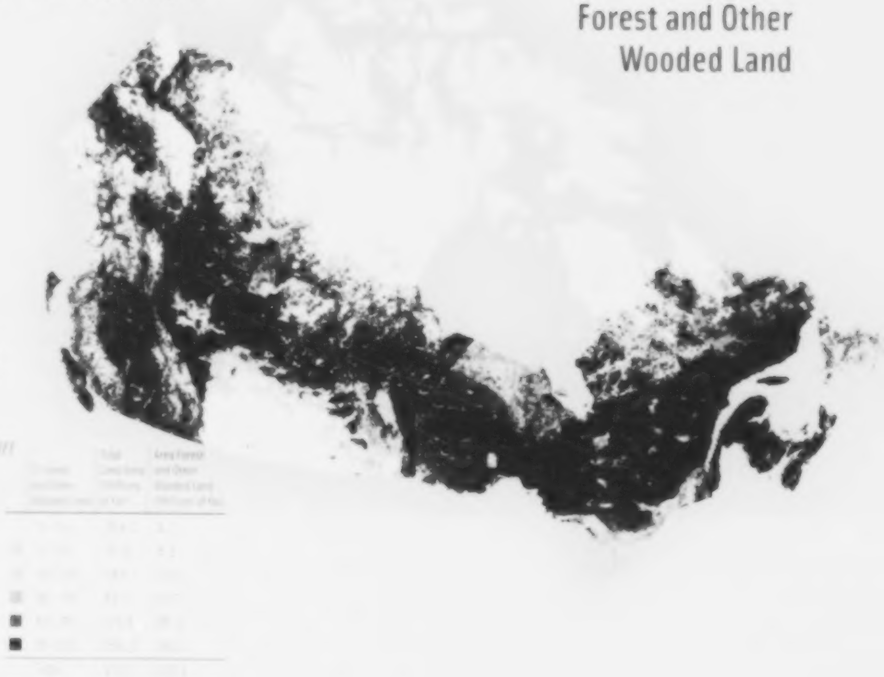
Land area
979.1 million ha

Forest and other wooded land
402.1 million ha

National parks (2004)
26.5 million ha

Park attendance (2004)
16.0 million person-visits

MAPLE TREE



Forest and Other Wooded Land

Ownership (2004)	
Provincial	77%
Federal	16%
Private	7%
Forest type (2004)	
Softwood	66%
Hardwood	12%
Mixedwood	22%
Potential harvest (2003)	238.8 million m^3
Harvest (volume) – Industrial roundwood (2002)	193.7 million m^3
Harvest (area) – Industrial roundwood (2002)	974 472 ha
Area planted (2002)	427 051 ha
Area seeded (2002)	18 906 ha
Area defoliated by insects and beetle-killed trees (2003)	19.2 million ha
Number of fires (2004)	6 634
Area burned (2004)	3.3 million ha

MAJOR VALUE-ADDED WOOD PRODUCTS

Value of shipments (2003)	$5.5 billion
Doors and windows	$2.1 billion
Flooring products	$1.5 billion
Prefabricated buildings	$797.8 million
Mobile homes	$387.1 million
Other products	$772.2 million

NON-TIMBER FOREST PRODUCTS

Production	Value	Quantity
Maple products (2004)	$151.9 million	26.9 million litres
Christmas trees (2003)*	$64.1 million	4.1 million
Wildlife pelts (minus sealskins) (2002)	$23.4 milion	889 000

INDUSTRY

Value of exports (2004)	$44.6 billion
Softwood lumber	24.71%
Newsprint	11.91%
Wood pulp	16.02%
Wood panels (waferboard, plywood, fibreboard, veneers, particleboard)	13.22%
Other paper and paperboard	16.23%
Converted paper	2.15%
Other products	15.76%
Major export markets (2004)	$44.6 billion
United States	80%
European Union	6%
Japan	5%
China	3%
South and Central America	1%
Other countries	6%
Balance of trade (2004)	$34.5 billion
Contribution to GDP (2004)	$35.9 billion
Value of shipments	not available
Exported	not available
Sold domestically	not available
Number of establishments	not available
Logging	not available
Wood product manufacturing (2003)	3 747
Paper manufacturing (2003)	870
Direct jobs (2004)	361 100
Indirect and induced jobs (2004)	555 100
Wages and salaries	not available
Logging	not available
Wood product manufacturing (2003)	$5.2 billion
Paper manufacturing (2003)	$5.3 billion
New investments (2004)	$3.1 billion

see page 30

*Based on estimates.

Numbers for sealskins are estimates based on the last five years' data.

BRITISH COLUMBIA

WESTERN RED CEDAR

Population (2005)
4.2 million

Land area
94.55 million ha

Forest and other wooded land
64.25 million ha

Provincial parks
10.3 million ha

[illegible]

Ownership (2004)	
Provincial	96%
Federal	1%
Private	3%
Forest type (2004)	
Softwood	82%
Hardwood	5%
Mixedwood	13%
Potential harvest (2003)	83.7 million m
Harvest (volume) – Industrial roundwood (2003)	65.4 million m
Harvest (area) – Industrial roundwood (2002)	189 277 ha
Area planted (2002)	155 405 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)	7.6 million ha
Number of fires (2004)	2 381
Area burned (2004)	222 209 ha

[illegible]

Value of exports (2004)	$14.7 billion
Softwood lumber	46.91%
Newsprint	4.14%
Wood pulp	20.25%
Wood panels (softwood plywood, waferboard/oriented strand board, particleboard)	9.36%
Other paper and paperboard	8.36%
Converted paper	0.13%
Other products	10.85%
Major export markets (2004)	$14.7 billion
United States	64.37%
European Union	7.20%
Japan	13.69%
China	4.94%
South and Central America	1.13%
Other countries	8.67%
Balance of trade (2004)	$13.3 billion
Value of shipments	not available
Logging	not available
Wood product manufacturing (321)	$10.3 billion
Paper manufacturing (322)	$5.6 billion
Number of establishments	not available
Logging	not available
Wood product manufacturing (321)	911
Paper manufacturing (322)	83
Direct jobs (2004)	79 800
Wages and salaries	not available
Logging	not available
Wood product manufacturing (321)	$1.7 billion
Paper manufacturing (322)	$868.2 million
New investments (2004)	$0.8 billion

ALBERTA

LODGEPOLE PINE

Population (2005)
3.2 million

Land area
65.44 million ha

Forest and other wooded land
36.39 million ha

Provincial parks
210 550 ha

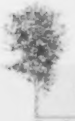
[illegible]

Ownership (2004)	
Provincial	89%
Federal	8%
Private	3%
Forest type (2004)	
Softwood	[illegible]
Hardwood	[illegible]
Mixedwood	[illegible]
Potential harvest (2003)	26.9 million m
Harvest (volume) – Industrial roundwood (2003)	24.2 million m
Harvest (area) – Industrial roundwood (2002)	68 430 ha
Area planted (2002)	38 270
Area seeded (2002)	1 450
Area defoliated by insects and beetle-killed trees (2003)	5.8 million ha
Number of fires (2004)	1 597
Area burned (2004)	234 748 ha

[illegible]

Value of exports (2004)	$3.4 billion
Softwood lumber	21.93%
Newsprint	3.85%
Wood pulp	35.22%
Wood panels (softwood plywood, waferboard/oriented strand board, particleboard)	31.15%
Other paper and paperboard	0.98%
Converted paper	0.85%
Other products	5.58%
Major export markets (2004)	$3.4 billion
United States	78.27%
European Union	1.37%
Japan	8.68%
China	3.27%
South and Central America	0.08%
Other countries	7.83%
Balance of trade (2004)	$3.1 billion
Value of shipments	not available
Logging	not available
Wood product manufacturing (321)	$1.9 billion
Paper manufacturing (322)	$1.4 billion
Number of establishments	not available
Logging	not available
Wood product manufacturing (321)	194
Paper manufacturing (322)	14
Direct jobs (2004)	22 900
Wages and salaries	not available
Logging	not available
Wood product manufacturing (321)	[illegible]
Paper manufacturing (322)	[illegible]
New investments (2004)	$0.3 billion

SASKATCHEWAN



WHITE BIRCH

Population (2005)
1.0 million

Land area
65.19 million ha

Forest and other wooded land
24.26 million ha

Provincial parks
1.2 million ha

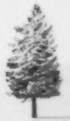
RESOURCES

Ownership (2004)	
Provincial	90%
Federal	4%
Private	6%
Forest type	
Softwood	47%
Hardwood	16%
Mixedwood	37%
Potential harvest (2003)[a]	8.5 million m^3
Harvest (volume) – Industrial roundwood (2003)[b]	5.0 million m^3
Harvest (area) – Industrial roundwood (2003)	29 053 ha
Area planted (2002)	13 073 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)[c]	511 780 ha
Number of fires (2004)[d]	328
Area burned (2004)[e]	258 441 ha

INDUSTRY

Value of exports (2004)	$810.4 million
Softwood lumber	12.62%
Newsprint	0.01%
Wood pulp	33.67%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	32.51%
Other paper and paperboard	17.87%
Converted paper	2.21%
Other products	1.10%
Major export markets (2004)	$810.4 million
United States	76%
European Union	11%
Japan	3%
China	4%
South and Central America	0%
Other countries	6%
Balance of trade (2004)	$725.2 million
Value of shipments	not available
Logging	not available
Wood product manufacturing (2003)	$406.3 million
Paper manufacturing (2003)	$461.0 million
Number of establishments	not available
Logging	not available
Wood product manufacturing (2003)	53
Paper manufacturing (2003)	10
Direct jobs (2004)	5 500
Wages and salaries	not available
Logging	not available
Wood product manufacturing (2003)	$70.3 million
Paper manufacturing (2003)	$78.4 million
New investments	not available

MANITOBA



WHITE SPRUCE

Population (2005)
1.2 million

Land area
63.62 million ha

Forest and other wooded land
36.35 million ha

Provincial parks
3.4 million ha

RESOURCES

Ownership (2004)	
Provincial	95%
Federal	2%
Private	3%
Forest type (2004)	
Softwood	74%
Hardwood	15%
Mixedwood	11%
Potential harvest (2003)[a]	9.6 million m^3
Harvest (volume) – Industrial roundwood (2003)[b]	2.0 million m^3
Harvest (area) – Industrial roundwood (2002)	15 042 ha
Area planted (2002)	8 334 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)[c]	131 135 ha
Number of fires (2004)[d]	234
Area burned (2004)[e]	23 117 ha

INDUSTRY

Value of exports (2004)	$737.1 million
Softwood lumber	10.37%
Newsprint	15.74%
Wood pulp	0.06%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	27.39%
Other paper and paperboard	11.96%
Converted paper	4.38%
Other products	30.10%
Major export markets (2004)	$737.1 million
United States	96.7%
European Union	0.4%
Japan	0.4%
China	0.1%
South and Central America	0.3%
Other countries	2.0%
Balance of trade (2004)	$373.8 million
Value of shipments	not available
Logging	not available
Wood product manufacturing (2003)	$658.1 million
Paper manufacturing (2003)	$501.9 million
Number of establishments	not available
Logging	not available
Wood product manufacturing (2003)	72
Paper manufacturing (2003)	27
Direct jobs (2004)	8 100
Wages and salaries	not available
Logging	not available
Wood product manufacturing (2003)	$128.4 million
Paper manufacturing (2003)	$89.4 million
New investments	not available

ONTARIO

EASTERN WHITE PINE

Population (2005)
12.5 million

Land area
107.48 million ha

Forest and other wooded land
68.29 million ha

Provincial parks
7.6 million ha

RESOURCES

Ownership (2004)	
Provincial	91%
Federal	1%
Private	8%
Forest type (2004)	
Softwood	58%
Hardwood	16%
Mixedwood	26%
Potential harvest (2003)	**34.2 million ha**
Harvest (volume) – Industrial roundwood (2003)	**24.2 million m³**
Harvest (area) – Industrial roundwood (2003)	**203 784 ha**
Area planted (2002)	**91 931 ha**
Area seeded (2002)	**17 440 ha**
Area defoliated by insects and beetle-killed trees (2003)	**4.9 million ha**
Number of fires (2004)	**431**
Area burned (2004)	**1 617 ha**

INDUSTRY

Value of exports (2004)	**$9.0 billion**
Softwood lumber	8.21%
Newsprint	12.71%
Wood pulp	11.11%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	16.88%
Other paper and paperboard	21.36%
Converted paper	6.35%
Other products	23.39%
Major export markets (2004)	**$9.0 billion**
United States	96.0%
European Union	1.2%
Japan	0.2%
China	0.4%
South and Central America	0.2%
Other countries	2.0%
Balance of trade (2004)	**$3.3 billion**
Value of shipments	**not available**
Logging	not available
Wood product manufacturing (2003)	$6.2 billion
Paper manufacturing (2003)	$10.9 billion
Number of establishments	**not available**
Logging	not available
Wood product manufacturing (2003)	940
Paper manufacturing (2003)	407
Direct jobs (2004)	**94 300**
Wages and salaries	**not available**
Logging	not available
Wood product manufacturing (2003)	$1.1 billion
Paper manufacturing (2003)	$1.8 billion
New investments (2004)	**$0.6 billion**

QUEBEC

YELLOW BIRCH

Population (2005)
7.6 million

Land area
151.89 million ha

Forest and other wooded land
84.58 million ha

Provincial parks
754 600 ha*

RESOURCES

Ownership (2004)	
Provincial	89%
Private	11%
Forest type (2004)	
Softwood	73%
Hardwood	11%
Mixedwood	16%
Potential harvest (2003)	**54.6 million m³**
Harvest (volume) – Industrial roundwood (2002)	**39.6 million m³**
Harvest (area) – Industrial roundwood (2003)	**303 720 ha**
Area planted (2002)	**84 807 ha**
Area seeded (2002)	**16 ha**
Area defoliated by insects and beetle-killed trees (2003)	**102 372 ha**
Number of fires (2004)	**319**
Area burned (2004)	**3 044 ha**

INDUSTRY

Value of exports (2004)	**$11.9 billion**
Softwood lumber	13.77%
Newsprint	20.04%
Wood pulp	8.16%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	10.65%
Other paper and paperboard	24.37%
Converted paper	2.10%
Other products	20.97%
Major export markets (2004)	**$11.9 billion**
United States	87.0%
European Union	6.0%
Japan	0.4%
China	2.0%
South and Central America	1.0%
Other countries	3.6%
Balance of trade (2004)	**$9.9 billion**
Value of shipments	**not available**
Logging	not available
Wood product manufacturing (2003)	$8.7 billion
Paper manufacturing (2003)	$10.7 billion
Number of establishments	**not available**
Logging	not available
Wood product manufacturing (2003)	1 131
Paper manufacturing (2003)	252
Direct jobs (2004)	**115 300**
Wages and salaries	**not available**
Logging	not available
Wood product manufacturing (2003)	$1.4 billion
Paper manufacturing (2003)	$1.6 billion
New investments (2004)	**$0.8 billion**

*Wildlife reserves included

SASKATCHEWAN

WHITE BIRCH

Population (2005)
1.0 million

Land area
65.19 million ha

Forest and other wooded land
24.26 million ha

Provincial parks
1.2 million ha

Ownership (2004)	
Provincial	89%
Federal	4%
Private	6%
Forest type	
Softwood	47%
Hardwood	15%
Mixedwood	38%
Potential harvest (2003)	8.5 million m
Harvest (volume) – industrial roundwood (2003)	5.0 million m
Harvest (area) – industrial roundwood (2003)	29 053 ha
Area planted (2002)	13 073 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)	511 780 ha
Number of fires (2004)	328
Area burned (2004)	258 441 ha

Value of exports (2004)	$810.4 million
Softwood lumber	27.62%
Newsprint	0.01%
Wood pulp	11.67%
Wood panels (Plywood, veneer, fibreboard, OSB, particleboard)	32.57%
Other paper and paperboard	17.87%
Converted paper	6.21%
Other products	3.10%
Major export markets (2004)	$810.4 million
United States	75%
European Union	11%
Japan	3%
China	4%
South and Central America	1%
Other countries	6%
Balance of trade (2004)	$725.2 million
Value of shipments	not available
Logging	not available
Wood product manufacturing (2002)	$405.1 million
Paper manufacturing (2002)	$461.2 million
Number of establishments	not available
Logging	not available
Wood product manufacturing (2002)	53
Paper manufacturing (2002)	16
Direct jobs (2004)	5 500
Wages and salaries	not available
Logging	not available
Wood product manufacturing (2002)	$70.3 million
Paper manufacturing (2002)	$79.4 million
New investments	not available

MANITOBA

WHITE SPRUCE

Population (2005)
1.2 million

Land area
63.62 million ha

Forest and other wooded land
36.35 million ha

Provincial parks
3.4 million ha

Ownership (2004)	
Provincial	93%
Federal	2%
Private	5%
Forest type (2004)	
Softwood	74%
Hardwood	11%
Mixedwood	15%
Potential harvest (2003)	9.6 million m
Harvest (volume) – industrial roundwood (2003)	2.0 million m
Harvest (area) – industrial roundwood (2002)	15 042 ha
Area planted (2002)	8 334 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)	131 135 ha
Number of fires (2004)	234
Area burned (2004)	23 117 ha

Value of exports (2004)	$737.1 million
Softwood lumber	11.52%
Newsprint	15.14%
Wood pulp	0.04%
Wood panels (Plywood, veneer, fibreboard, OSB, particleboard)	33.33%
Other paper and paperboard	21.98%
Converted paper	4.38%
Other products	10.11%
Major export markets (2004)	$737.1 million
United States	96.7%
European Union	0.4%
Japan	0.4%
China	0.1%
South and Central America	0.3%
Other countries	2.0%
Balance of trade (2004)	$373.8 million
Value of shipments	not available
Logging	not available
Wood product manufacturing (2002)	$658.1 million
Paper manufacturing (2002)	$501.9 million
Number of establishments	not available
Logging	not available
Wood product manufacturing (2002)	73
Paper manufacturing (2002)	22
Direct jobs (2004)	8 100
Wages and salaries	not available
Logging	not available
Wood product manufacturing (2002)	$128.4 million
Paper manufacturing (2002)	$89.1 million
New investments	not available

ONTARIO

EASTERN WHITE PINE

Population (2005)
12.5 million

Land area
107.48 million ha

Forest and other wooded land
68.29 million ha

Provincial parks
7.6 million ha

Ownership (2004)	
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Forest type (2004)	
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Potential harvest (2003)	34.2 million ha
Harvest (volume) – Industrial roundwood (2003)	24.2 million m
Harvest (area) – Industrial roundwood (2003)	203 784 ha
Area planted (2002)	91 931 ha
Area seeded (2002)	17 440 ha
Area defoliated by insects and beetle-killed trees (2003)	4.9 million ha
Number of fires (2004)	431
Area burned (2004)	1 617 ha

Value of exports (2004)	$9.0 billion
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible] paperboard)	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Major export markets (2004)	$9.0 billion
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Balance of trade (2004)	$3.3 billion
Value of shipments	not available
Logging	not available
[illegible]	[illegible]
Paper manufacturing [illegible]	$10.9 billion
Number of establishments	not available
Logging	not available
[illegible]	940
Paper manufacturing [illegible]	407
Direct jobs (2004)	94 300
Wages and salaries	not available
Logging	not available
[illegible]	$1.1 billion
Paper manufacturing [illegible]	[illegible]
New investments (2004)	$0.6 billion

QUEBEC

YELLOW BIRCH

Population (2005)
7.6 million

Land area
151.89 million ha

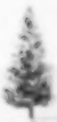
Forest and other wooded land
84.58 million ha

Provincial parks
754 600 ha*

Ownership (2004)	
[illegible]	[illegible]
[illegible]	[illegible]
Forest type (2004)	
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Potential harvest (2003)	54.6 million m
Harvest (volume) – Industrial roundwood (2002)	39.6 million m
Harvest (area) – Industrial roundwood (2003)	303 720 ha
Area planted (2002)	84 807 ha
Area seeded (2002)	16 ha
Area defoliated by insects and beetle-killed trees (2003)	102 372 ha
Number of fires (2004)	315
Area burned (2004)	3 044 ha

Value of exports (2004)	$11.9 billion
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible] paperboard)	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Major export markets (2004)	$11.9 billion
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Balance of trade (2004)	$9.9 billion
Value of shipments	not available
Logging	not available
[illegible]	[illegible]
Paper manufacturing [illegible]	[illegible]
Number of establishments	not available
Logging	not available
[illegible]	[illegible]
Paper manufacturing [illegible]	[illegible]
Direct jobs (2004)	115 300
Wages and salaries	not available
Logging	not available
[illegible]	[illegible]
Paper manufacturing [illegible]	[illegible]
New investments (2004)	$0.8 billion

NEW BRUNSWICK



BALSAM FIR

Population (2005)
751,257

Land area
7.31 million ha

Forest and other wooded land
6.21 million ha

Provincial parks
22 084 ha

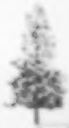
RESOURCES

Ownership (2004)	
Provincial	48%
Federal	2%
Private	50%
Forest type (2004)	
Softwood	44%
Hardwood	25%
Mixedwood	31%
Potential harvest (2003)	**11.4 million m^3**
Harvest (volume) – Industrial roundwood (2003)	**10.4 million m^3**
Harvest (area) – Industrial roundwood (2003)	**111 315 ha**
Area planted (2002)	**18 049 ha**
Area seeded (2002)	**not available**
Area defoliated by insects and beetle-killed trees (2003)	**1 504 ha**
Number of fires (2004)	**240**
Area burned (2004)	**295 ha**

INDUSTRY

Value of exports (2004)	**$2.5 billion**
Softwood lumber	23.14%
Newsprint	6.99%
Wood pulp	19.01%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	7.35%
Other paper and paperboard	27.34%
Converted paper	1.34%
Other products	14.83%
Major export markets (2004)	**$2.5 billion**
United States	89%
European Union	4%
Japan	1%
China	1%
South and Central America	1%
Other countries	3%
Balance of trade (2004)	**$2.2 billion**
Value of shipments	**not available**
Logging	not available
Wood product manufacturing (2003)	$1.5 billion
Paper manufacturing (2003)	$2.3 billion
Number of establishments	**not available**
Logging	not available
Wood product manufacturing (2003)	163
Paper manufacturing (2003)	29
Direct jobs (2004)	**19 300**
Wages and salaries	**not available**
Logging	not available
Wood product manufacturing (2003)	$212.4 million
Paper manufacturing (2003)	$350.2 million
New investments	**not available**

NOVA SCOTIA



RED SPRUCE

Population (2005)
938,538

Land area
5.53 million ha

Forest and other wooded land
4.35 million ha

Provincial parks
31 000 ha

RESOURCES

Ownership (2004)	
Provincial	29%
Federal	3%
Private	68%
Forest type (2004)	
Softwood	58%
Hardwood	13%
Mixedwood	29%
Potential harvest (2003)	**6.7 million m^3**
Harvest (volume) – Industrial roundwood (2003)	**5.7 million m^3**
Harvest (area) – Industrial roundwood (2003)	**52 858 ha**
Area planted (2002)	**11 105 ha**
Area seeded (2002)	**not available**
Area defoliated by insects and beetle-killed trees (2003)	**17 561 ha**
Number of fires (2004)	**258**
Area burned (2004)	**290 ha**

INDUSTRY

Value of exports (2004)	**$1.0 billion**
Softwood lumber	21.72%
Newsprint	24.85%
Wood pulp	21.04%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	2.89%
Other paper and paperboard	21.70%
Converted paper	3.23%
Other products	4.56%
Major export markets (2004)	**$1.0 billion**
United States	70.1%
European Union	13.0%
Japan	0.4%
China	0.1%
South and Central America	8.0%
Other countries	8.4%
Balance of trade (2004)	**$988.4 million**
Value of shipments	**not available**
Logging	not available
Wood product manufacturing (2003)	$551.7 million
Paper manufacturing (2003)	$799.4 million
Number of establishments	**not available**
Logging	not available
Wood product manufacturing (2003)	314
Paper manufacturing (2003)	14
Direct jobs (2004)	**11 000**
Wages and salaries	**not available**
Logging	not available
Wood product manufacturing (2003)	$91.9 million
Paper manufacturing (2003)	$139.5 million
New investments	**not available**

PRINCE EDWARD ISLAND

RED OAK

Population (2005)	137 734
Land area	0.58 million ha
Forest and other wooded land	0.27 million ha
Provincial parks	2 100 ha

RESOURCES

Ownership (2004)	
Provincial	8%
Federal	1%
Private	91%
Forest type (2004)	
Softwood	24%
Hardwood	29%
Mixedwood	47%
Potential harvest (2003)	**0.5 million m^3**
Harvest (volume) – Industrial roundwood (2003)	**0.5 million m^3**
Harvest (area) – Industrial roundwood (2003)	**5 754 ha**
Area planted (2002)	**824 ha**
Area seeded (2002)	**not available**
Area defoliated by insects and beetle-killed trees (2003)	**not available**
Number of fires (2004)	**20**
Area burned (2004)	**15 ha**

INDUSTRY

Value of exports (2004)	**$19.0 million**
Softwood lumber	88.61%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	0.36%
Other paper and paperboard	0.07%
Converted paper	2.78%
Other products	8.64%
Major export markets (2004)	**$19.0 million**
United States	98.1%
European Union	0.5%
South and Central America	1.0%
Other countries	0.4%
Balance of trade (2004)	**$19.0 million**
Value of shipments	**not available**
Logging	not available
Wood product manufacturing (2002)	$50.4 million
Paper manufacturing (2002)	$23.5 million
Number of establishments	**not available**
Logging	not available
Wood product manufacturing (2002)	15
Paper manufacturing (2002)	5
Direct jobs (2004)	**600**
Wages and salaries	**not available**
Logging	not available
Wood product manufacturing (2002)	$6.8 million
Paper manufacturing (2002)	$2.4 million
New investments	**not available**

NEWFOUNDLAND AND LABRADOR

BLACK SPRUCE

Population (2005)	515 986
Land area	40.30 million ha
Forest and other wooded land	20.07 million ha
Provincial parks	22 500 ha

RESOURCES

Ownership (2004)	
Provincial	98%
Private	2%
Forest type (2004)	
Softwood	92%
Hardwood	3%
Mixedwood	5%
Potential harvest (2003)	**2.5 million m^3**
Harvest (volume) – Industrial roundwood (2003)	**2.1 million m^3**
Harvest (area) – Industrial roundwood (2002)	**21 978 ha**
Area planted (2002)	**4 831 ha**
Area seeded (2002)	**not available**
Area defoliated by insects and beetle-killed trees (2003)	**79 899 ha**
Number of fires (2004)	**153**
Area burned (2004)	**2 362 ha**

INDUSTRY

Value of exports (2004)	**$522.5 million**
Softwood lumber	2.80%
Newsprint	95.22%
Wood pulp	0.56%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	0.02%
Other paper and paperboard	1.18%
Converted paper	0.05%
Other products	0.03%
Major export markets (2004)	**$522.5 million**
United States	41%
European Union	30%
South and Central America	18%
Other countries	11%
Balance of trade (2004)	**$510.3 million**
Value of shipments	**not available**
Logging	not available
Wood product manufacturing (2002)	$70.1 million
Paper manufacturing (2002)	$463.3 million
Number of establishments	**not available**
Logging	not available
Wood product manufacturing (2002)	53
Paper manufacturing (2002)	5
Direct jobs (2004)	**4 100**
Wages and salaries	**not available**
Logging	not available
Wood product manufacturing (2002)	$14.5 million
Paper manufacturing (2002)	$103.3 million
New investments	**not available**

[illegible]

NEW BRUNSWICK

Population [illegible]

Land area

Forest and other wooded land

Provincial parks

NOVA SCOTIA

Population [illegible]

Land area

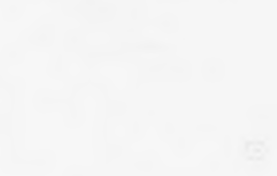
Forest and other wooded land

Provincial parks

[illegible]	11.4 million m³
[illegible]	10.2 million m³
[illegible]	111 115 ha
[illegible]	15 849 ha
[illegible]	not available
[illegible]	1 504 ha
[illegible]	280
[illegible]	295 ha
[illegible]	$2.5 billion
[illegible]	$2.3 billion
[illegible]	$2.1 billion
[illegible]	not available
[illegible]	not available
[illegible]	16 300
[illegible]	not available
[illegible]	not available

[illegible]	6.1 million m³
[illegible]	5.7 million m³
[illegible]	52 858 ha
[illegible]	11 105 ha
[illegible]	not available
[illegible]	11 501 ha
[illegible]	258
[illegible]	750 ha
[illegible]	$1.5 billion
[illegible]	$1.4 billion
[illegible]	$888.4 million
[illegible]	not available
[illegible]	not available
[illegible]	11 000
[illegible]	not available
[illegible]	not available

PRINCE EDWARD ISLAND



Population [illegible]

Land area [illegible]

Forest and other wooded land [illegible]

Provincial parks [illegible]

[illegible]	[illegible]
[illegible]	0.5 million m³
[illegible]	0.5 million m³
[illegible]	5,764 ha
[illegible]	824 ha
[illegible]	not available
[illegible]	not available
[illegible]	20
[illegible]	15 ha
[illegible]	$19.0 million
[illegible]	$19.5 million
[illegible]	$19.5 million
[illegible]	not available
[illegible]	not available
[illegible]	650
[illegible]	not available
[illegible]	not available

NEWFOUNDLAND AND LABRADOR

Population [illegible]

Land area [illegible]

Forest and other wooded land [illegible]

Provincial parks [illegible]

[illegible]	[illegible]
[illegible]	2.1 million m³
[illegible]	2.3 million m³
[illegible]	21,873 ha
[illegible]	8,835 ha
[illegible]	not available
[illegible]	29,933 ha
[illegible]	151
[illegible]	3,857 ha
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	not available
[illegible]	not available
[illegible]	[illegible]
[illegible]	not available
[illegible]	not available

YUKON TERRITORY

SUBALPINE FIR

Population (2005)
31 227

Land area
48.49 million ha

Forest and other wooded land
22.79 million ha

Territorial parks
not available

RESOURCES

Ownership (2004)	
Federal	100%
Forest type (2004)	
Softwood	79%
Hardwood	2%
Mixedwood	19%
Potential harvest (2003)	238 thousand m³
Harvest (volume) – Industrial roundwood (2003)	7 thousand m³
Harvest (area) – Industrial roundwood (2003)	44 ha
Area planted (2002)	310 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)	41 640 ha
Number of fires (2004)	282
Area burned (2004)	1.8 million ha

INDUSTRY

Value of exports (2004)*	$961 842
Softwood lumber	1.5%
Other products	98.5%
Major export markets (2004)*	$961 842
United States	100%
Balance of trade (2004)*	$949 953

NORTHWEST TERRITORIES

JACK PINE

Population (2005)
42 944

Land area
128.12 million ha

Forest and other wooded land
33.35 million ha

Territorial parks
13 363 ha

RESOURCES

Ownership (2004)	
Federal	100%
Forest type (2004)	
Softwood	53%
Mixedwood	47%
Potential harvest	not applicable
Harvest (volume) – Industrial roundwood (2003)	6 thousand m³
Harvest (area) – Industrial roundwood (2003)	31 ha
Area planted (2002)	112 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)	not available
Number of fires (2004)	297
Area burned (2004)	515 621 ha

INDUSTRY

Value of exports (2004)*	$69 954
Softwood lumber	17.61%
Other products	82.39%
Major export markets (2004)*	$69 954
United States	37.38%
European Union	62.62%
Balance of trade (2004)*	$69 954

NUNAVUT

Population (2005)
29 683

Land area
200.60 million ha

Forest and other wooded land
0.94 million ha

Territorial parks
not available

RESOURCES

Ownership (2004)	
Federal	100%
Forest type (2004)	
Softwood	52%
Mixedwood	48%

INDUSTRY

Value of exports (2004)*	$106 088
Softwood lumber	4.38%
Wood panels (waferboard, plywood, fibreboard, veneer, particleboard)	35.39%
Other products	60.23%
Major export markets (2004)*	$106 088
United States	4.38%
European Union	0.97%
Japan	3.56%
South and Central America	29.67%
Other countries	61.42%
Balance of trade (2004)*	$106 218

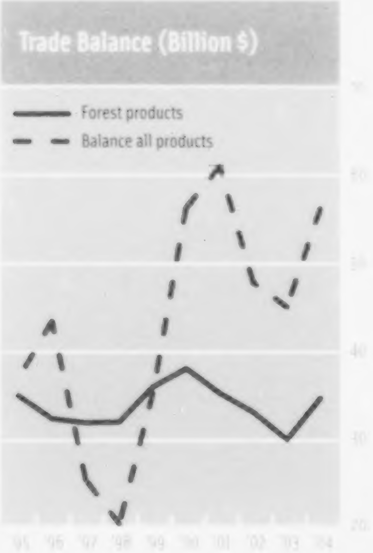
*Data reported are from Statistics Canada. It has been suggested by territorial government sources that the jurisdiction of origin may be overrepresented in the available data.

FORESTRY STATISTICS AND TRENDS

TRADE BALANCE

Canada exports more goods than it imports, resulting in a surplus trade balance, and forest products play a major role in this surplus. Second only in revenue to energy products, forest products contributed $34.5 billion to the Canadian trade balance in 2004. Despite the increase in the Canadian dollar against the American dollar in 2004, a trend that reduces export revenues in Canadian dollars and encourages increased imports, the trade balance in forest products increased by $4.8 billion, or 16%, between 2003 and 2004. This increase is indicative of the strength of the forest sector. Driven by an increase in world oil prices, the energy sector also contributed more to the Canadian trade balance in 2004; it experienced one-year growth of $11.2 billion. The total trade balance was $56.1 billion, an increase of 25% over 2003; this puts an end to two consecutive decreases since the record year of 2001, when the Canadian trade balance reached $61 billion.

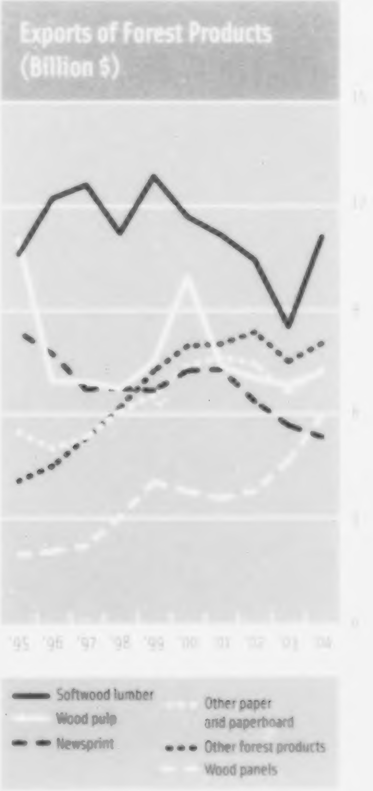
Exports	Billion $	Annual change (%)	
	2004	1 year	10 years
Trade balance	56.1	25.0	4.3
Forest products contribution	34.5	16.0	-0.1


Trade Balance (Billion $)

EXPORTS OF FOREST PRODUCTS

Except for newsprint, Canadian exports of forest products increased in 2004 to $44.6 billion. This was an increase of $5 billion, or 12.6%, over 2003. The export value of softwood lumber rose by $2.5 billion, or 30.2%, over 2003. However, this was a correction with respect to abnormally low exports in 2003; the value of softwood lumber exports in 2004 was not exceptional compared to the level achieved in the previous decade. The increase in the export value of structural panels, which rose by $1.3 billion between 2003 and 2004, is more a reflection of long-term changes. For a decade, the annual growth rate of the value of structural panel exports (plywood, veneer, oriented strandboard, waferboard and fibreboard) averaged 11.6%, tripling in 10 years. This brought it, in 2004, above the value of newsprint for the first time. Seen as the flagship of the Canadian forest industry, newsprint has been losing ground for a decade in North America, especially in Canada. Over the past decade, the value of exports has fallen by $3 billion, because of a decrease in the amount exported and lower prices, for an average annual loss of 4.4%.

Product	Billion $	Annual change (%)	
	2004	1 year	10 years
Softwood lumber	11.0	30.2	0.5
Newsprint	5.3	-5.9	-4.4
Wood pulp	7.1	5.0	-4.2
Wood panels	6.0	27.3	11.6
Other paper and paperboard	7.2	9.6	2.8
Other forest products	8.0	12.9	6.3
Total	**44.6**	**12.6**	**0.6**


Exports of Forest Products (Billion $)

YUKON TERRITORY

Population (2005)
31 227

Land area
48.49 million ha

Forest and other wooded land
22.79 million ha

Territorial parks
not available

Ownership (2004)	
[illegible]	[illegible]
Forest type (2004)	
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Potential harvest (2003)	238 thousand m
Harvest (volume) – industrial roundwood (2003)	7 thousand m
Harvest (area) – industrial roundwood (2003)	44 ha
Area planted (2002)	310 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)	41 640 ha
Number of fires (2004)	282
Area burned (2004)	1.8 million ha

Value of exports (2004)	$961 842
[illegible]	[illegible]
[illegible]	[illegible]
Major export markets (2004)	$961 842
[illegible]	[illegible]
Balance of trade (2004)	$949 951

NORTHWEST TERRITORIES

Population (2005)
42 944

Land area
128.12 million ha

Forest and other wooded land
33.35 million ha

Territorial parks
12 383 ha

Ownership (2004)	
[illegible]	[illegible]
Forest type (2004)	
[illegible]	[illegible]
[illegible]	[illegible]
Potential harvest	not applicable
Harvest (volume) – industrial roundwood (2003)	6 thousand m
Harvest (area) – industrial roundwood (2003)	31 ha
Area planted (2002)	112 ha
Area seeded (2002)	not available
Area defoliated by insects and beetle-killed trees (2003)	not available
Number of fires (2004)	297
Area burned (2004)	515 621 ha

Value of exports (2004)	$69 954
[illegible]	[illegible]
[illegible]	[illegible]
Major export markets (2004)	$69 954
[illegible]	[illegible]
[illegible]	[illegible]
Balance of trade (2004)	$69 954

NUNAVUT

Population (2005)
29 683

Land area
200.60 million ha

Forest and other wooded land
0.94 million ha

Territorial parks
not available

Ownership (2004)	
[illegible]	[illegible]
Forest type (2004)	
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

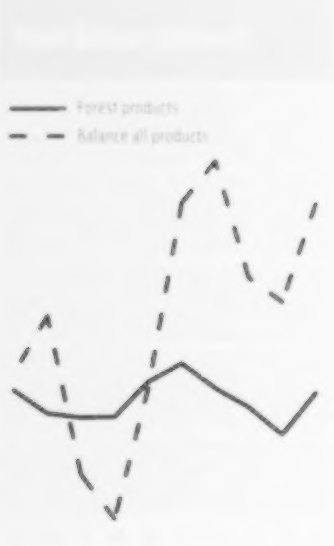
Value of exports (2004)	$106 088
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Major export markets (2004)	$106 088
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Balance of trade (2004)	$106 218

FORESTRY STATISTICS AND TRENDS

TRADE BALANCE

[illegible]

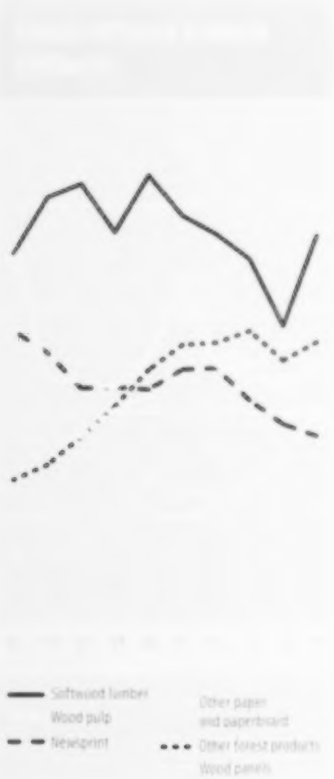
Exports	Billion $	Annual change (%)	
	2004	1 year	10 years
Trade balance	[illegible]	[illegible]	[illegible]
Forest products contribution	[illegible]	[illegible]	[illegible]

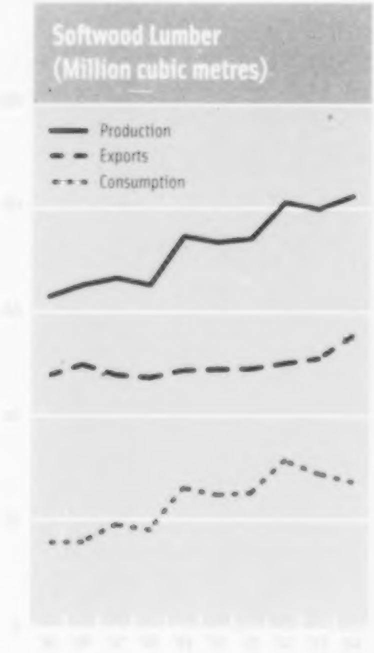


EXPORTS OF FOREST PRODUCTS

[illegible]

Product	Billion $	Annual change (%)	
	2004	1 year	10 years
Softwood lumber	11.8	30.2	0.5
Newsprint	5.4	-5.9	-4.4
Wood pulp	7.1	5.0	-4.7
Wood panels	6.0	27.3	11.9
Other paper and paperboard	7.2	9.6	2.6
Other forest products	8.0	12.9	6.3
Total	44.6	12.6	0.8

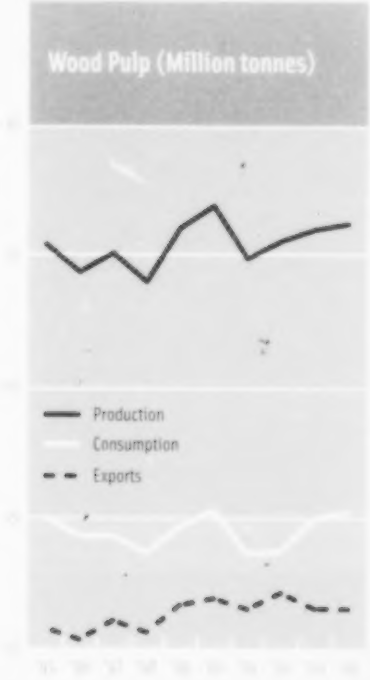




SOFTWOOD LUMBER

Softwood lumber production is unquestionably the main use of roundwood harvested from Canadian forests. Other roundwood users, such as wood panelling producers, have less need for raw material, and pulp and paper producers use primarily residue from sawmilling operations and recycled paper as a fibre source. Thus, in Canada, roundwood harvesting and softwood lumber production are closely linked. In 2004, British Columbia faced a mountain pine beetle epidemic and took emergency measures to recover the wood attacked by these insects before it was completely lost. Consequently, the forest industry in this province, which accounts for half of Canada's softwood lumber capacity, increased its softwood lumber production, for an unprecedented Canadian total of 81.7 million cubic metres in 2004. This was an increase of 2.5 million cubic metres, or 3.1%, over 2003. The lumber was first sold on foreign markets, and therefore softwood lumber exports increased to 55.2 million cubic metres in 2004, an increase of 8.5% over the previous year. Owing to a slowdown in residential construction, Canadian consumption fell for a second consecutive year. The 2004 total was 27.4 million cubic metres, a decline of 5.3%.

Softwood Lumber	Million cubic metres	Annual change (%)	
	2004	1 year	10 years
Production	81.7	3.1	2.7
Exports	55.2	8.5	1.5
Consumption	27.4	-5.3	5.7



WOOD PULP

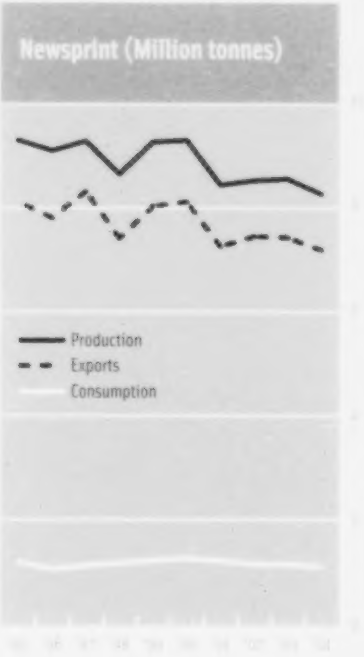
Canada is the world's second-largest producer of wood pulp (the United States is the largest) and sells more abroad than any other country, accounting for 30% of world exports. In 2004, quantities produced, exported and consumed in Canada matched those of 2003, the only difference being that, when converted to Canadian dollars, prices were up by approximately 5% relative to that year.

Wood Pulp	Million tonnes	Annual change (%)	
	2004	1 year	10 years
Production	26.2	0.8	0.3
Exports	11.5	-0.1	0.7
Consumption	15.2	1.8	0.1

NEWSPRINT

The Canadian newsprint industry has slowed down for the last several years. Consumption of newsprint in North America is declining, a situation that began with the partial replacement of newsprint by a higher-quality paper suitable for use in printing colour photos for advertising inserts. Canadian newsprint producers adapted to this change by converting their machinery to produce the higher-quality paper, but when old equipment can no longer be converted, paper machines must be scrapped and mills closed. The list of recent mill closures seems endless: 640 jobs lost in Port-Alfred, Quebec; production stoppage and three Kruger machines temporarily shut down in various mills in Saint John, New Brunswick; mill closure in Port Alberni, British Columbia. Even the plant in Sheldon, Texas, has been closed, with the loss of 400 jobs. Nevertheless, production capacity is still too high relative to the declining consumption of newsprint in North America, and more plant closures can be expected in the near future.

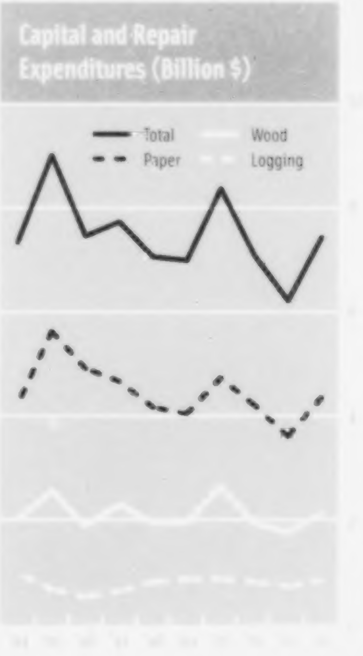
Newsprint	Million tonnes	Annual change (%)	
	2004	1 year	10 years
Production	8.2	-3.4	-1.2
Exports	7.1	-3.2	-1.2
Consumption	1.1	-4.0	-0.8

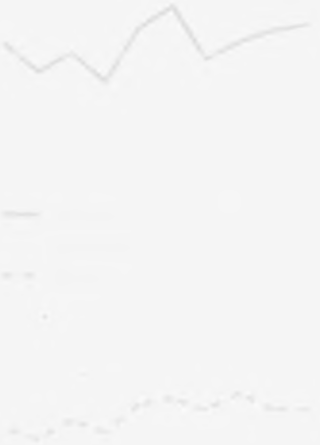

Newsprint (Million tonnes)

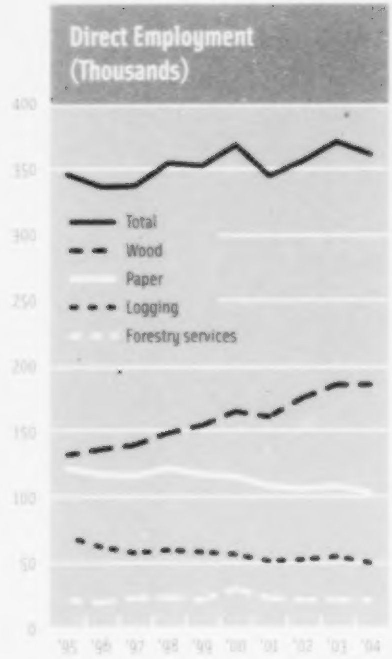
CAPITAL AND REPAIR EXPENDITURES

New investments and repairs in the forest industries rose by $1.2 billion to $7.4 billion in 2003, representing a 19.3% increase over 2002. But that year is not a good point of reference because it was 2002 that saw the lowest capital and repair expenditures of the last decade. The level of spending in 2003 is more in line with the average for the past 10 years. Given that the favourable exchange rate for the Canadian dollar made it possible for this country's businesses to buy machinery and equipment more cheaply abroad, it is surprising that these expenditures were not higher. In 2003, new capital spending of $3.7 billion equalled repair expenditures. As usual, the sector with the highest spending was paper, with $4.3 billion in total expenditures.

Capital and Repair Expenditures	Billion $	Annual change (%)	
	2003	1 year	10 years
Wood product manufacturing	2.2	20.0	0.5
Paper manufacturing	4.3	20.1	0.3
Logging	0.9	13.9	-1.5
Total	**7.4**	**19.3**	**0.1**


Capital and Repair Expenditures (Billion $)





Direct Employment (Thousands)

EMPLOYMENT IN FOREST INDUSTRIES

According to Statistics Canada's labour force census, there were 361 100 jobs in forest industries in 2004, representing a decrease of 9 500 jobs compared with the record year of 2003. A sharp decline was also seen in logging and in paper manufacturing sectors, each of which saw a loss of 4 600 jobs. In the wood product manufacturing and forestry services sectors, employment levels remained largely unchanged from the previous year. These annual results are consistent with the trend observed in the last 10 years. For example, 18 100 jobs were lost in the paper manufacturing sector between 1995 and 2004 and 19 700 jobs were lost in logging operations, while, over the same period, the wood product manufacturing sector grew by 53 600 to a total of 185 800 jobs in 2004.

Employment	Person-years	Annual change (%)	
	2004	1 year	10 years
Wood product manufacturing	185 800	0.1	3.5
Paper manufacturing	103 800	-4.3	-1.6
Logging	50 200	-8.5	-3.3
Forestry services	21 300	-1.7	-0.2
Total	**361 100**	**-2.6**	**0.4**

INDIRECT AND INDUCED EMPLOYMENT

The forest industry produces a number of economic spin-offs. Intermediate goods are needed in order to operate in the forest industry: wood, of course, but also chemicals, packing materials, energy, etc. When such goods are purchased, jobs are created outside the forestry industry. Based on Statistics Canada's input-output model, the forest industry generated 200 000 such jobs in 1999. The forest industry also invests in machinery and equipment, as well as the construction of mills and roads. In 1999, close to 36 000 jobs were created as a result of such investments. In addition, transporting finished forest products to domestic or foreign markets generated another 26 000 jobs. In total, nearly 262 000 jobs outside the forest industry were generated as a result of the procurement of intermediate goods, investments of various kinds, and the transport of finished forest products. Because such jobs are associated with forest activity, but created outside the industry, they are known as indirect jobs.

In 1999, forestry workers and those employed in related forest activity earned $24.9 billion, much of which they spent on consumer goods. Another 280 000 jobs were needed to manufacture those consumer goods. These jobs, generated by workers' spending, are known as induced jobs. Thus there were nearly 542 000 indirect and induced jobs related to the forestry industry in 1999.

According to Statistics Canada's Labour Force Survey, there was a 2.5% increase in the number of jobs in the forest industry between 1999 and 2004. Assuming a proportional increase in indirect and induced jobs, an estimated 555 100 indirect and induced jobs were associated with the forestry industry in 2004, or an estimated total of 916 200 direct, indirect and induced jobs.

Employment	1999	2004
Direct jobs	352 300	361 100
Indirect jobs	261 525	268 100
Induced jobs	280 012	287 000
Total	**893 837**	**916 200**

ANNUAL ALLOWABLE CUTS AND HARVESTS

On provincial public lands, harvest levels are a legislated requirement associated with the licensing of forest management activities. The level is usually specified in terms of an Allowable Annual Cut (AAC) associated with the specific forest estate. The AAC represents the level of harvest to be achieved annually over a specified number of years.

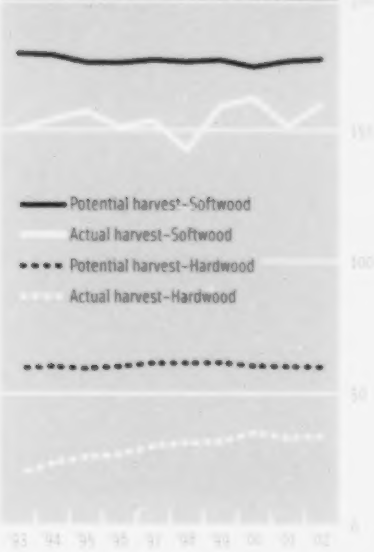
The method of determining AACs is complex and varies significantly across Canada. The calculations are based on the estimated extent of the forest land base; the growth rate of trees; losses due to fire, insects and disease; accessibility; economic conditions; environmental considerations; silvicultural investment; degree of protection; and management objectives. AACs are revised every 5 to 10 years to reflect changing conditions and improvements in data and knowledge.

While harvest levels on provincial land are regulated, on private and federal land they are not. The managers of these lands may have commitments to specific harvest targets, but there are no legislated accountability mechanisms. Since the estimates presented in this graph account for private and federal lands as well as provincial Crown lands, they are referred to as "potential harvest" rather than AACs.

Canada's potential harvest has remained relatively stable since 1992. The 2002 potential harvest was almost the same as the previous year, with 35% of Canada's potential harvest in British Columbia, 37% in Quebec and Ontario, about 19% in the Prairie provinces, and 9% in the Atlantic region. The hardwood harvest has been steadily increasing over time, and has doubled over the last decade. Softwood harvests, while variable, have remained relatively constant since peaking in 1987; they have averaged 160 million cubic metres over the past 10 years.

Softwood and Hardwood Harvests	Million cubic metres	Annual change (%)	
	2002	1 year	10 years
Potential harvest–Softwood	177.4	0.5	-0.1
Actual harvest–Softwood	160.0	5.5	0.6
Potential harvest–Hardwood	60.1	-0.3	0.1
Actual harvest–Hardwood	33.7	2.1	5.9

Potential vs. Actual Harvest (Million cubic metres)



EMPLOYMENT IN FOREST INDUSTRIES

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	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]

INDIRECT AND INDUCED EMPLOYMENT

[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]

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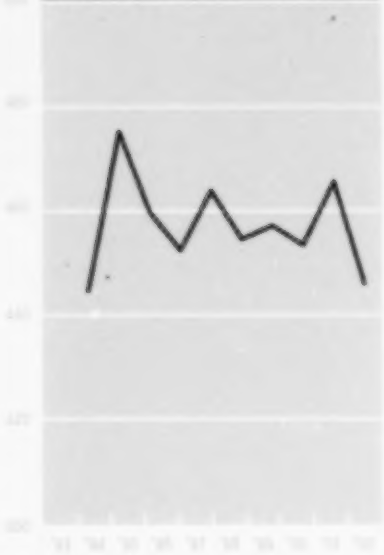
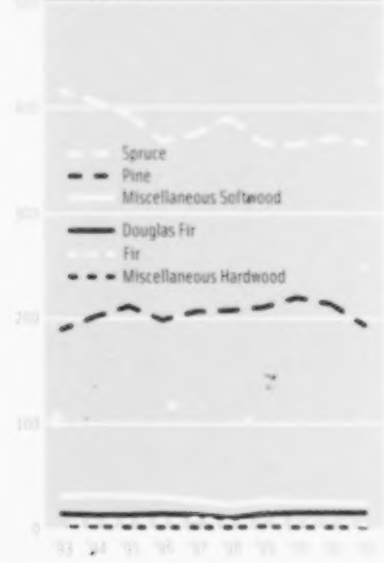
Area Planted and Seeded (Thousand hectares)



Tree Planting in Canada (Million seedlings)



PLANTING AND SEEDING

Planting refers to establishing a forest by setting out seedlings (young saplings grown from seed), transplants or cuttings in an area. Direct seeding entails the sowing of seeds by hand or machinery directly into the ground.

Planting and seeding increased significantly throughout the 1980s as a result of federal/provincial/territorial agreements. Most of the efforts were concentrated in areas that had been disturbed in the past by fire, insects, disease or harvesting, and had not regenerated. The intention was to reforest the backlog of disturbed areas and restore the commercial forests. Most jurisdictions at that time were increasingly relying on natural regeneration. In 1992, about 463 million hectares were planted or seeded. Although the area harvested each year through the 1990s tended to be greater than the area harvested in the 1980s, the area of planting and seeding has not needed to increase proportionately, because harvest methods have been modified to enhance or protect natural regeneration.

Today, Canadian forestry relies on advance regeneration and appropriate harvesting techniques to ensure that the majority of harvested areas will regenerate naturally. The remaining sites are regenerated by planting or seeding.

The areas in the accompanying graph include regeneration of areas disturbed by harvesting and natural disturbances. They also include a small area of afforestation (i.e., conversion of land that has not been forested for a significant period of time to forested land).

In 2002, British Columbia planted 192 million seedlings and Ontario planted 132 million. Of the 609 million seedlings planted in Canada, 89.3% were on provincial Crown land.

The forest tree species planted most often are spruces, followed by pines and other softwood (coniferous) species.

Area and Number of Seedlings Planted	2002	Annual change (%)	
		1 year	10 years
Area planted and seeded (thousand hectares)	446	-4.1	0.0
Seedlings planted (million)	609	-4.2	-0.8

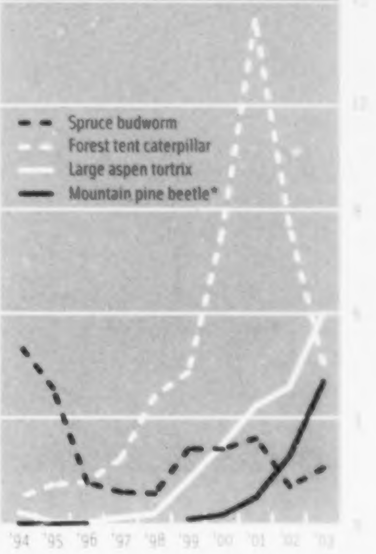
INSECT DEFOLIATION AND TREE MORTALITY

Insect populations were relatively stable in 2003, except for the mountain pine beetle epidemic in interior British Columbia, the large aspen tortrix in western Canada, and the forest tent caterpillar in central Canada. The mountain pine beetle epidemic, the largest ever recorded in British Columbia, continued to expand in lodgepole pine forest, causing high tree mortality. Defoliation by some insects was also significant. The large aspen tortrix increased significantly, mainly in Alberta, while the forest tent caterpillar decreased significantly, mainly in Ontario. In 2003, the spruce budworm defoliated a large amount of spruce-fir forest in western Canada, and the western spruce budworm defoliation of Douglas fir forests increased in British Columbia. Infestation of the gypsy moth, an invasive alien insect, had increased significantly in 2002 but has decreased in 2003.

Outbreaks of the balsam fir sawfly, a native defoliator, usually last three to four years, with a varying number of years between outbreaks. The main host is the balsam fir, but the sawfly has also been found on white spruce, black spruce and red spruce. High sawfly populations have occurred in Newfoundland and Labrador, Nova Scotia, Quebec and Ontario. Infestations usually begin in commercial thinnings of balsam fir stands before spreading to unthinned stands. In Newfoundland and Labrador, small outbreaks occurred between 1990 and 1995, expanded in 1996 and 1997, and have remained at about the same level to 2003; tree mortality and growth losses are occurring.

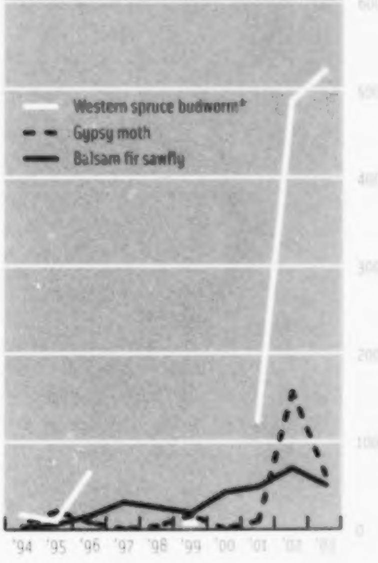
Invasive alien species attacking our trees have received much media attention recently. One of these is the emerald ash borer, *Agrilus planipennis*, which has become established in southern Ontario. A native of Asia, this insect was likely transported to North America in solid wood packing material or shipping containers. In July 2002, ash trees infested by the emerald ash borer were detected within the city limits of Windsor and in Essex County in Ontario. All native ash species are susceptible to attack and defoliation. Ash trees are an important part of our urban and forest environment, and Canada is working with the United States on strategies to combat the spread of the emerald ash borer.

Area Defoliated and Beetle-Killed Trees by Major Insects (Million hectares)

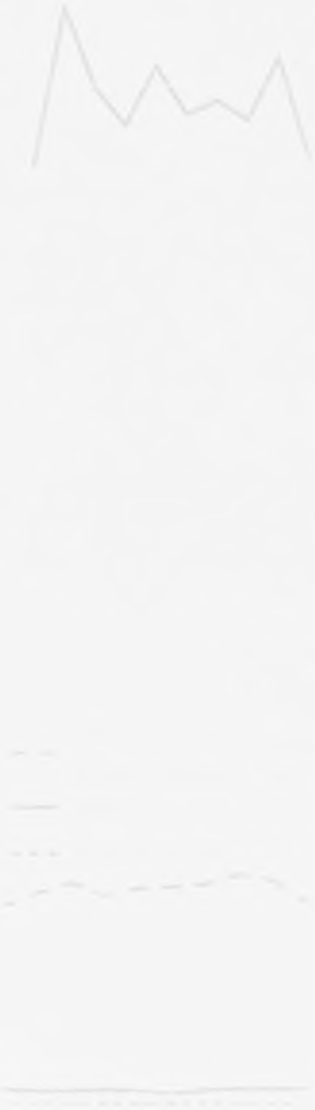


*Data for 1997 and 1998 are not available.

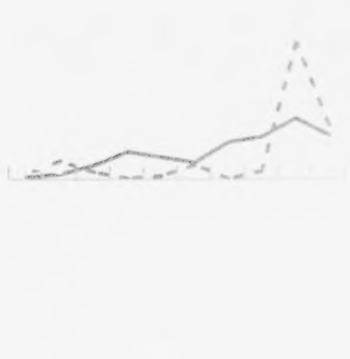
Area Defoliated by Gypsy Moth, Western Spruce Budworm and Balsam Fir Sawfly (Thousand hectares)

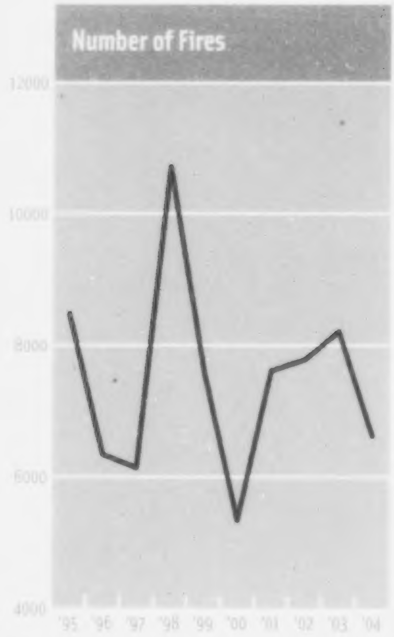


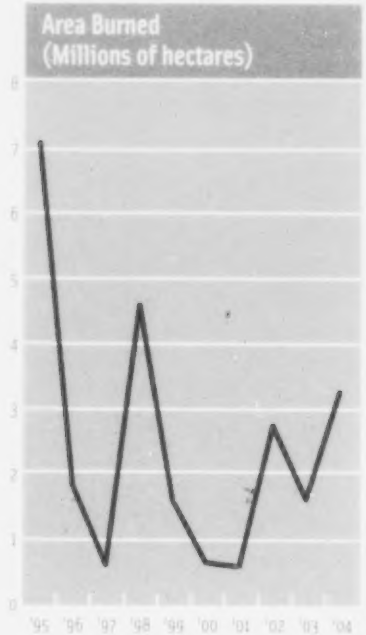
*Data for 1997, 1998 and 2000 are not available.



INSECT DEFOLIATION AND TREE MORTALITY




Number of Fires


Area Burned (Millions of hectares)

FOREST FIRES

Forest fires in Canada vary considerably in number and in size of forest area burned. There is a great fluctuation in fire activity both among provinces and territories in a given year and within a given province or territory over the years. For example, British Columbia went from a low of 1 876 hectares burned in 1997 to a record high of 266 412 hectares burned in 2003.

At the end of the 2004 fire season, the total number of fires was slightly below average (88%) and the total area burned was above average (132%). Since 1994 a decreasing overall trend in the total number of fires has resulted in an average annual number of fires for this 10-year period of 7 496. The average annual area burned each year has remained relatively constant at 2.5 million hectares per year.

A majority of the area burned in 2004 (55%) was in the Yukon, where 282 fires burned 1.8 million hectares. This was the worst fire season on record for the Yukon, when twice as much area burned as in 1958, the previous record. Fire suppression costs exceeded $21 million. Of these fires, 247, or 88%, were caused by lightning. Normally lightning ignites only 50% of the fires while the remainder are caused by humans.

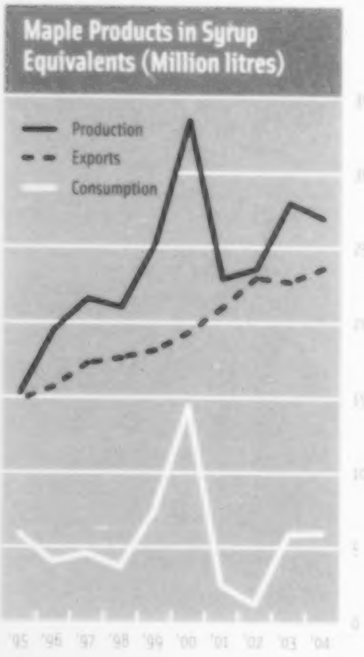
In Canada, lightning causes 45% of forest fires while accounting for 81% of the area burned (based on statistics from 1990 to 2002). The disparity in these values arises from the nature of lightning-caused fires, in that thunderstorms can ignite dozens of fires at a time, often in remote areas. Both these factors tend to cause longer reaction times for suppression resources; which allow the fires to grow unabated longer, thus increasing their chance to escape initial attack.

Forest Fires	2004	10-year average
Total number of fires	6 634	7 496
Total area burned	3.3 million ha	2.5 million ha

MAPLE PRODUCTS

Exports of maple products, expressed in syrup equivalents, were up in 2004, reaching 23.6 million litres. However, at 26.9 million litres, Canadian production was down by 3.6% from 2003. Production fell short of domestic and foreign consumption for the fourth consecutive year, making it possible to reduce inventories, which have been too high since the exceptional harvest of 2000. Quebec is easily the province with the largest production, at 24.8 million litres (in syrup equivalents) in 2004. The province of Ontario is the second-largest producer, with one million litres, closely followed by New Brunswick, with a production of 0.8 million litres. The gross value of Canadian production in 2004 is estimated at $151.9 million, a decrease of $6 million from 2003.

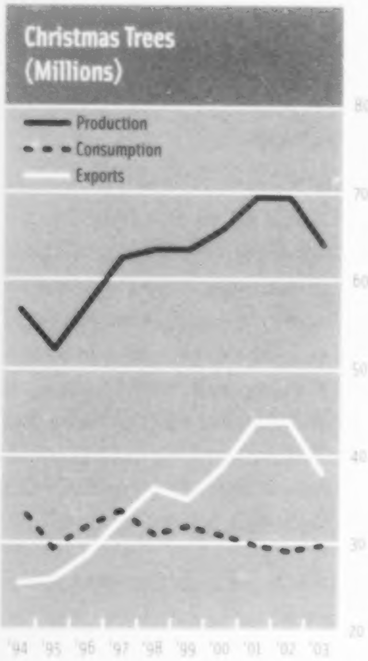
Maple Products	Million litres	Annual change (%)	
	2004	1 year	10 year
Production	26.9	-3.6	5.8
Exports	23.6	4.1	4.8
Consumption	6.0	1.5	0.1


Maple Products in Syrup Equivalents (Million litres)

CHRISTMAS TREES

It is difficult to obtain a precise estimate of Christmas tree production in Canada. The best attempt relies on the National Forestry Database, and involves correcting Quebec production figures to allow for domestic deliveries. Thus approximately 4.1 million trees were produced in 2003, at an estimated value of $64.1 million. This represents decreases of 160 000 trees and $5 million from the 2002 figures. The drop in production can be entirely explained by a decrease in exports, probably in response to the rise in the Canadian dollar relative to the U.S. dollar. In 2003, three provinces were almost entirely responsible for exports of 2.6 million Christmas trees, valued at $38 million. In 2003, Quebec exported 1.3 million, Nova Scotia 0.8 million, and New Brunswick 0.4 million. Every year, some 1.7 million Christmas trees are purchased in Canada, 250 000 of which are imported.

Christmas Trees	Million trees	Annual change (%)	
	2003	1 year	10 years
Production	4.1	-3.8	0.0
Exports	2.6	-5.2	2.2
Consumption	1.7	1.2	-2.6


Christmas Trees (Millions)

MAPLE PRODUCTS

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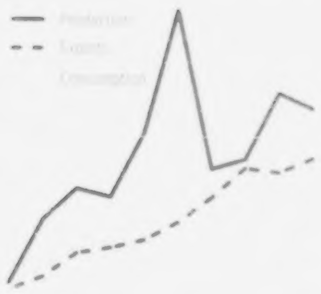

Maple Products	Million litres	Annual change (%)	
	2004	1 year	10 year
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CHRISTMAS TREES

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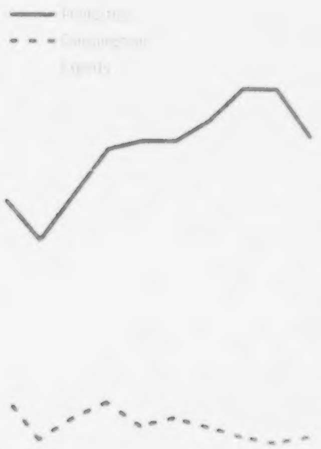

Christmas Trees	Million trees	Annual change (%)	
	2003	1 year	10 years
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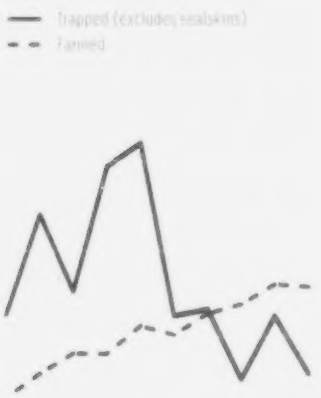

WILDLIFE/FARM PELTS

[illegible]

Wildlife/Farm Pelts	Million pelts	Annual change (%)	
	2002	1 year	10 years
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

NOTES

DATA SOURCES

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FOREST AND OTHER WOODED LAND

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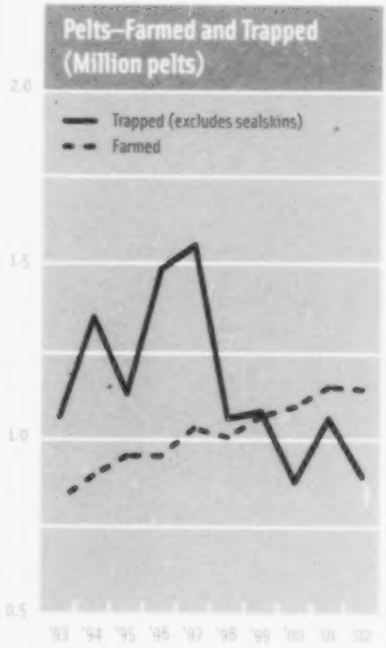

Pelts—Farmed and Trapped (Million pelts)

WILDLIFE/FARM PELTS

The year 2002 was one of the worst years of the decade in terms of the harvest of wildlife pelts. Although a harvest of over one million pelts is the rule, the total for 2002 was only 0.9 million. Fortunately, the increase in prices provided trappers with revenues that were approximately equivalent to those of the previous year, i.e., $23.4 million in comparison to $24 million in 2001. Farm pelt production was roughly the same as in 2001, at 1.1 million pelts, valued at $49.9 million.

Wildlife/Farm Pelts	Million pelts	Annual change (%)	
	2002	1 year	10 years
Farmed	1.1	-0.6	3.3
Trapped	0.9	-15.5	-1.7

NOTES

DATA SOURCES

The main sources for the data are Statistics Canada, Environment Canada, the Forest Products Association of Canada, the Pulp and Paper Products Council, Natural Resources Canada—Canadian Forest Service, the National Forestry Database and the Canadian Interagency Forest Fire Centre. Most of the information for the National Forestry Database was collected by provincial and territorial natural resource ministries. At the time of publication, data were preliminary. As data are finalized, they will be made available on the Internet in the National Forestry Database Program's *Compendium of Canadian Forestry Statistics* (http://nfdp.ccfm.org).

In 2000, major conceptual and methodological changes were incorporated into the Annual Survey of Manufacturers (ASM). With 2000 as reference year, the universe was expanded to cover all manufacturing units. In addition to the incorporated manufacturing businesses over $30,000 in sales of manufactured goods and with employees, the new ASM also includes: a) all incorporated businesses under $30,000 that had employees, b) all incorporated businesses that did not have any employees regardless of their annual sales value, and c) all unincorporated businesses. (Reference: CANSIM Tables 301-0003 and 301-0005 at http://cansim2.statcan.ca)

Beginning with reference year 2000, data for Head Offices are no longer included, which affects the following variables: administration employees and salaries; total employees, salaries and wages; cost of materials, supplies and goods for resale; value of shipments; and other revenue and total value added.

FOREST AND OTHER WOODED LAND

"Other wooded land" refers to treed wetlands and land with slow-growing and scattered trees. The data regarding Canada's forest and other wooded land are based on Canada's Forest Inventory 2001 (CanFI 2001), which uses different categories than CanFI 1991. Comparisons between CanFI 1991 and CanFI 2001 cannot be made in a meaningful way due to a number of differences in methods and definitions in the source inventories. (For information on what is being done to address these limitations, see page 63.)

LAND AREA

Canada's land area of 979.1 million hectares excludes geographical features such as lakes, rivers, streams and watersheds.

FOREST RESOURCE

Ownership data are provided for the total forest and other wooded land.

Although the federal government maintains ownership in the Yukon and Northwest Territories, the territorial governments have responsibility for management of forests and selected other natural resources.

a Annual allowable cut (AAC): Information on allowable annual cut (AAC) has been reported in *The State of Canada's Forests* since the fourth report to Parliament. A series of profiles giving the current status of the potential harvest in each jurisdiction is presented in the report. In addition to AAC—which properly pertains only to the regulated harvest from provincial Crown land—the profiles include information on potential harvests from private and federal lands.

The national potential harvest figure was arrived at by estimating some data for private and federal lands.

- Ontario, Saskatchewan, Alberta, Yukon, N.W.T. and Nunavut do not report potential harvest from private lands.
- In British Columbia, Schedule A lands are those private industrial lands that are included in Tree Farm Licences (TFLs) for which AACs are set by the Chief Forester, and harvest levels are subject to the same control as Crown lands.

b Harvesting: The national and provincial figures for harvesting volume include data for industrial roundwood only. The harvest level for fuelwood or firewood for a single province may range as high as 2.2 million cubic metres, and is not included in these harvest figures.

- Although the AAC for British Columbia does not include all private lands, these lands are included in the harvest figure. The yearly harvest rate for British Columbia may fluctuate, and in some cases it may exceed the AAC. Over a five-year period, however, the harvest figure would be equal to or lower than the AAC.

c Insect defoliation and beetle-killed trees: The data relating to insects were provided by provincial and territorial agencies, and they include moderate to severe defoliation only. Defoliation does not always imply mortality; for example, stands with moderate defoliation often recover and may not lose much growth. Also, defoliation is mapped on an insect species basis, and a given area may be afflicted by more than one insect at a time. This may result in double or triple counting in areas affected by more than one insect, exaggerating the extent of the total area defoliated.

d All "area burned" figures are from the Canadian Interagency Forest Fire Centre. Area burned includes areas within National Parks.

PUTTING A FACE ON THE BOREAL

As you will realize going through this year's *State of Canada's Forests* report, Canada's boreal forest is the focus of this edition.

Given that the boreal stretches across the northern part of this country from Newfoundland to northeastern British Columbia and up into the Territories, comprises 77 percent of our forest cover and, according to our forest industry, accounts for about 50 percent of our annual harvest, it is well worth a look.

Found throughout this annual report to Parliament is information on the history of the boreal, on the role it plays in the life of Canada, on the birds that populate it and the waters that flow through it, about non-timber forest products and about our use of remote sensing to help manage it.

And—importantly—one also finds information about the people who live and work in it. The word "importantly" is used here advisedly, because one of the misconceptions, or perhaps urban myths, about the boreal is its characterization as a vast, pristine Eden.

Certainly, there's a nugget of truth in that portrait. There are, indisputably, tracts of uninhabited wilderness. But that characterization deals only with the land base.

To think of the boreal as being only about trees is to ignore significant and very human aspects of the boreal forest. The boreal is also about the people who live there, their cities, towns and villages, and their quality of life.

There are hundreds of long-standing communities in Canada's boreal, as one can see from the map at the end of the report. The people in those communities—the Aboriginal people who have lived there for thousands of years and the more recent settlers from Europe and other parts of the world who have arrived over the past 500 years—make them what they are. They live and work there for a variety of reasons, and their aspirations and concerns are as valid as those of people living in other parts of the world, especially in regard to issues that directly affect them.

We have all heard how forests—and by that, in Canada, people usually mean the boreal forest—form the lungs of the earth. People have legitimate concerns about how the world's forests are being managed.

In many cases, the people who live and work in the boreal attach the greatest value to the trees. They have an underlying reverence for, and recognition of, their relationship with nature. But when discussions go on about the future of the forests—discussions that focus on setting aside large areas of the boreal—their opinions are seldom sought, their needs rarely considered.

Discussions of such significance to boreal dwellers cannot feature only voices from Toronto, Vancouver, New York, Los Angeles,

Berlin or London. They must also include the voices of the thousands of people who live in our boreal communities.

One of the commitments of Natural Resources Canada's Canadian Forest Service is to ensure that those people will be heard, and we, along with our provincial and territorial colleagues, are currently developing options that will assist in this.

When one thinks in terms of the size of forest resources, there are three countries that can be considered forest "superpowers"—Russia, Brazil and Canada. Two of those superpowers—Canada and Russia—are endowed with boreal forest.

Looking at the circumpolar map on page 45, one can see that Russia's huge boreal forest dwarfs ours. Canada has about 30 percent of the world's boreal within its borders, Russia has about 60 percent. The Scandinavian countries, Alaska and northern Japan all have boreal forests within their boundaries also.

In Canada, it is our belief that discussions on the stewardship of the boreal forest should involve all boreal nations. To that end we, as one of the two major boreal stewards, have already begun a dialogue with our Russian colleagues. Our aim is to develop areas of cooperation in which we can mutually benefit in terms of managing the boreal forest in a sustainable fashion. We also anticipate opening discussions with the other boreal nations in the near future.

Canada is a world leader in sustainable forest management—not perfect, by any means, but our processes are transparent and open and we stand behind our practices and policies. We believe that by working with the other boreal nations, Canada can export leading-edge tools and technology to assist the sustainable management process, while learning from others' best practices in what is essentially a textbook example of thinking locally and acting globally.

Brian Emmett

Assistant Deputy Minister, Canadian Forest Service

IS CANADA'S BOREAL FOREST SHRINKING OR EXPANDING?

In North America, the boreal forest stretches from Newfoundland across most of northern Canada and into Alaska. It also extends northward along the Mackenzie delta to the Arctic Ocean. Although the area of the boreal region has not been precisely measured in the past, several estimates have been made of boreal forest for the world, for North America, and within Canada. These estimates are largely based on comparisons of general forest cover maps with broad-scale maps showing boundaries between boreal regions and polar or temperate regions.

National estimates of the total amount of boreal forest in Canada have varied considerably, since no definitive spatial depiction of the boreal region has been available. But improvements in how the inventory is done and how measurements are taken, along with a consensus by provincial natural resources agencies on what constitutes boreal, have given us a much more definitive picture of Canada's boreal forest. The real extent of the boreal region in Canada has now been determined using Canada's National Forest Inventory (CanFI 2001) — a compilation of existing provincial, territorial and federal inventories — and the terrestrial ecozones framework of Canada.

Canada's boreal region is composed of portions of 8 of the country's 15 terrestrial ecological zones (ecozones), totalling 553 million hectares (see map at the end of the report). This region is a mosaic of forest, barren land, meadows and peatlands. The definition of boreal forest incorporates both forest and other wooded land, with wooded land considered by CanFI 2001 as treed wetlands and land with slow-growing and scattered trees. Thus the Canadian boreal forest totals 310 million hectares, which represents 77 percent of Canada's total forest area. Of the 893 million hectares of global boreal forest (as determined by the United Nations Food and Agriculture Organization), Canada's boreal forest makes up close to 30 percent.

IS CANADA'S VAST EXPANSE OF BOREAL FOREST SHRINKING OR EXPANDING?

To answer this question, we must take both afforestation (permanent conversion to forest of land previously not forested) and deforestation (permanent conversion of forest land to non-forest land) into account. A recent analysis estimated that the current annual deforestation rate in Canada is approximately 92 500 hectares per year (925 km²/yr). This figure only gives us part of the picture because it is merely an estimate; it includes all types of forests (temperate mixedwood and hardwood as well as boreal), and it does not consider afforestation at all. But it does tell us that, for the country as a whole, the rate of deforestation is insignificant considering that Canada's total forest area is approximately 400 million hectares. And, since much of the deforestation has taken place in the temperate mixedwood and hardwood regions, we can conclude that the total area of boreal forest in Canada is neither shrinking nor expanding significantly.

However, oil and gas exploration, hydro-electric projects, town and city expansion, and the extension of agriculture along the boreal fringe have resulted in loss of boreal forest in some regions. One example has occurred along the southern fringe of the western boreal forest within the Aspen Parkland. Since European settlement, over half of the boreal Parkland forest has been cleared, mostly for agriculture. Across Alberta, more trees are removed from the boreal forest every year for agricultural purposes and for oil and gas exploration than for timber harvest (which approximates 68 000 hectares annually, according to the Senate Sub-Committee on the Boreal Forest). And while areas deforested due to oil and gas exploration are not generally returned to their forest state, provincial and territorial regulations require areas harvested for timber to be successfully regenerated to a healthy growing forest.

In eastern Canada, over the past 40 years about 900 000 hectares of peatlands and other lowland ecosystems within the boreal region have been lost to flooding for hydro-electric reservoirs. According to Environment Canada, current reservoir proposals could affect another one million hectares by the year 2010.

In the future, climate change may have the greatest impact on the extent of Canada's boreal forest. The results of the *Third Assessment Report in 2001 on Climate Change* by the International Panel on Climate Change suggest that over the next hundred years there may be significant changes to ecosystem boundaries, plant growth and ecosystem productivity, disturbances related to fire and insects, and the carbon cycle. For example, climate models suggest that global warming may shift the boreal forest farther north from its present location.

For the Record

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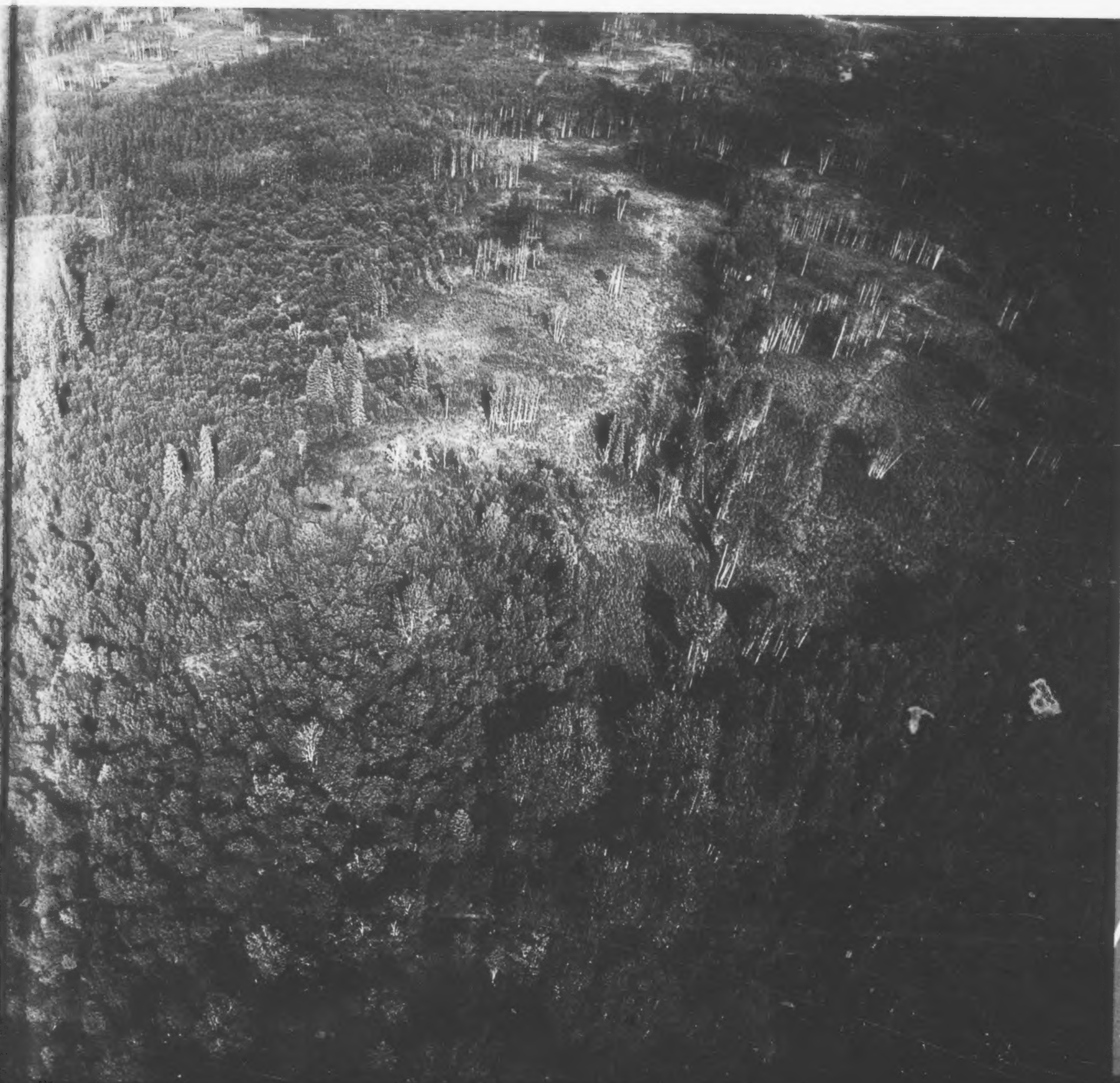
Researchers anticipate that the preferred geographic range of boreal tree species may shift northward by 300 to 500 kilometres, and a good portion of the existing boreal forest may be replaced by a temperate forest characteristic of southern Ontario and the northern United States. At the same time, much of what is now the central boreal may have climatic conditions similar to those of the prairie grasslands.

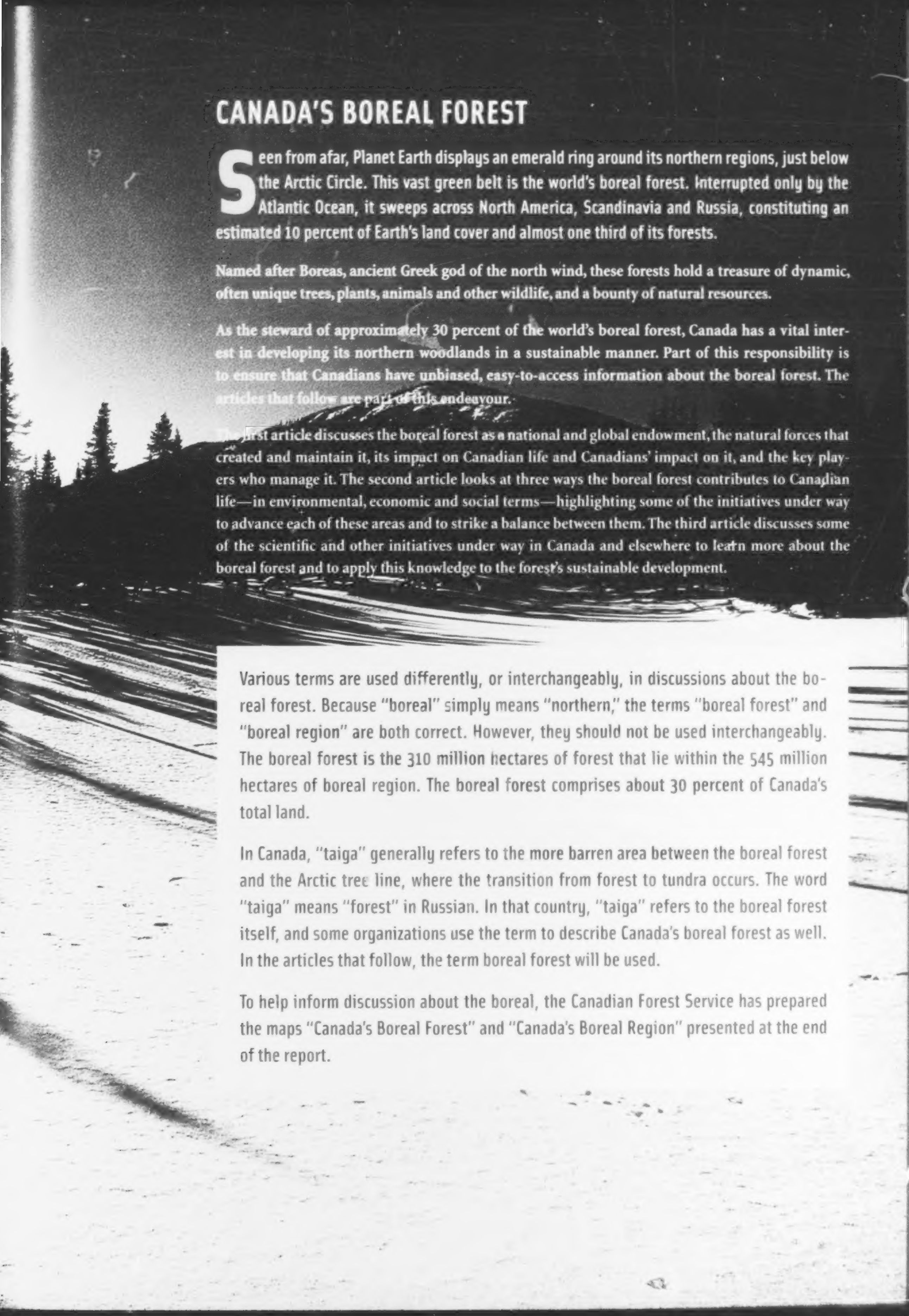
However, climate change itself is only one factor determining how the boreal forest would change with global warming. Soil conditions, moisture availability, migration rates of forest species, and competition from non-boreal species all play a role.

Even without a substantial increase or decrease in forest area, climate change can have profound effects on the boreal forest. The nature, frequency and extent of natural disturbances such as fire, insect and disease infestations, and extreme weather events could change in ways that put more stress on the health and integrity of the existing forest. In addition, human activity continues to put more and more pressure on sensitive boreal habitats, old-growth ecosystems, and other ecological components of the large boreal ecosystem.

The combination of all of these stresses may affect the future size of Canada's boreal forest, as well as the overall health and ecological integrity of this vast region.



FEATURE ARTICLES



CANADA'S BOREAL FOREST

Seen from afar, Planet Earth displays an emerald ring around its northern regions, just below the Arctic Circle. This vast green belt is the world's boreal forest. Interrupted only by the Atlantic Ocean, it sweeps across North America, Scandinavia and Russia, constituting an estimated 10 percent of Earth's land cover and almost one third of its forests.

Named after Boreas, ancient Greek god of the north wind, these forests hold a treasure of dynamic, often unique trees, plants, animals and other wildlife, and a bounty of natural resources.

As the steward of approximately 30 percent of the world's boreal forest, Canada has a vital interest in developing its northern woodlands in a sustainable manner. Part of this responsibility is to ensure that Canadians have unbiased, easy-to-access information about the boreal forest. The articles that follow are part of this endeavour.

The first article discusses the boreal forest as a national and global endowment, the natural forces that created and maintain it, its impact on Canadian life and Canadians' impact on it, and the key players who manage it. The second article looks at three ways the boreal forest contributes to Canadian life—in environmental, economic and social terms—highlighting some of the initiatives under way to advance each of these areas and to strike a balance between them. The third article discusses some of the scientific and other initiatives under way in Canada and elsewhere to learn more about the boreal forest and to apply this knowledge to the forest's sustainable development.

Various terms are used differently, or interchangeably, in discussions about the boreal forest. Because "boreal" simply means "northern," the terms "boreal forest" and "boreal region" are both correct. However, they should not be used interchangeably. The boreal forest is the 310 million hectares of forest that lie within the 545 million hectares of boreal region. The boreal forest comprises about 30 percent of Canada's total land.

In Canada, "taiga" generally refers to the more barren area between the boreal forest and the Arctic tree line, where the transition from forest to tundra occurs. The word "taiga" means "forest" in Russian. In that country, "taiga" refers to the boreal forest itself, and some organizations use the term to describe Canada's boreal forest as well. In the articles that follow, the term boreal forest will be used.

To help inform discussion about the boreal, the Canadian Forest Service has prepared the maps "Canada's Boreal Forest" and "Canada's Boreal Region" presented at the end of the report.

A GLOBAL ENDOWMENT

The Canadian portion of the boreal forest starts in the Yukon and northeastern British Columbia, and stretches across the northern parts of the Prairie provinces, Quebec and Ontario, to Labrador and Newfoundland. It forms a band more than 1 000 kilometres wide between the frozen tundra of the Arctic to the north and the more temperate forests and grasslands to the south. It covers about 30 percent of Canada's land mass, and constitutes 77 percent (or 310 million hectares) of Canada's 402 million hectares of forest and other wooded land.

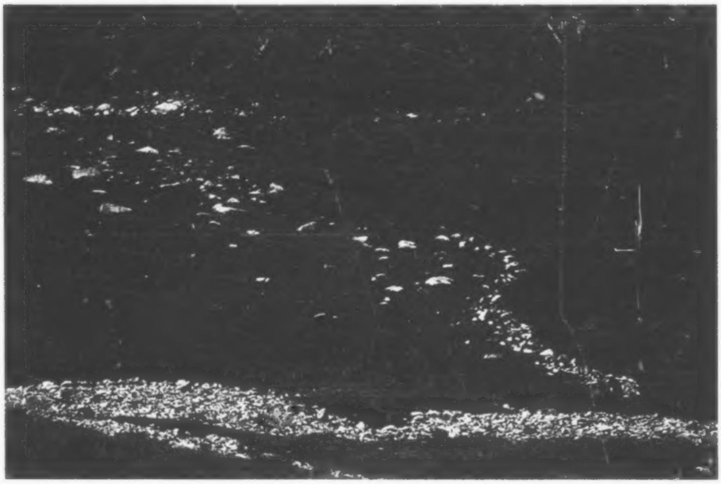
Some 20 species of trees, mostly coniferous, reside in these northern woodlands. The most common species are spruce, fir, pine and tamarack. This predominance of a few coniferous species contributes to the forest's relatively uniform appearance from afar. At closer range, the boreal forest's composition varies considerably depending on climate, topography, soil, and the effects of fire, insects and disease. The result is a patchwork of stands of trees, large and small, old and young, at different successional stages, each supporting different birds and fur-bearing animals.

The boreal forest contains an abundance of Canada's signature wildlife, vast freshwater resources (including an estimated 1.5 million lakes), and some of the world's richest deposits of natural resources.

It supports a myriad of mammals, such as moose, wolves, caribou, bears, rodents, rabbits, lynx and mink, including both the largest mammals on the continent—wood bison—and the smallest—pygmy shrews. The birds are the most dynamic of boreal wildlife. While some species, such as finches, chickadees, crows, owls, ravens and woodpeckers, remain year-round, most migrate. About half of Canada's 450 avian species use the boreal forest, and up to 5 billion individual birds migrate south and return north each year.

Winters in the boreal forests are long, cold and dark; the growing period is short, and the seasons change quickly. The ground is snow-covered up to eight months a year, and some areas are underlain by permafrost. These factors largely dictate the type of flora and fauna that live here.

Conifer trees are uniquely designed to weather the boreal climate. Their needles, for example, are narrow, with thick waxy coatings to prevent water loss during the dry winters and to allow snow loads to slide off. Their dark colour helps them to absorb heat from the sun and to begin photosynthesis early in the spring. In the winter, their trunks hold little sap; consequently, their tissues contain few ice crystals.



Several species of mammals and birds have evolved in shape and colour patterns, as well as in behaviours, to cope with the winters. Some, such as bears, hibernate. Others, such as geese, ducks and many types of songbirds, fly south. The chickadee's black and white feather patterns are designed to absorb heat and ensure optimal insulation for their sleep in snow holes. Some mammals, such as the lynx and rabbit, have adapted to living year-round in the boreal environment. The snowshoe hare, for example, changes colour from brownish or greyish in summer to white in winter, to provide camouflage.

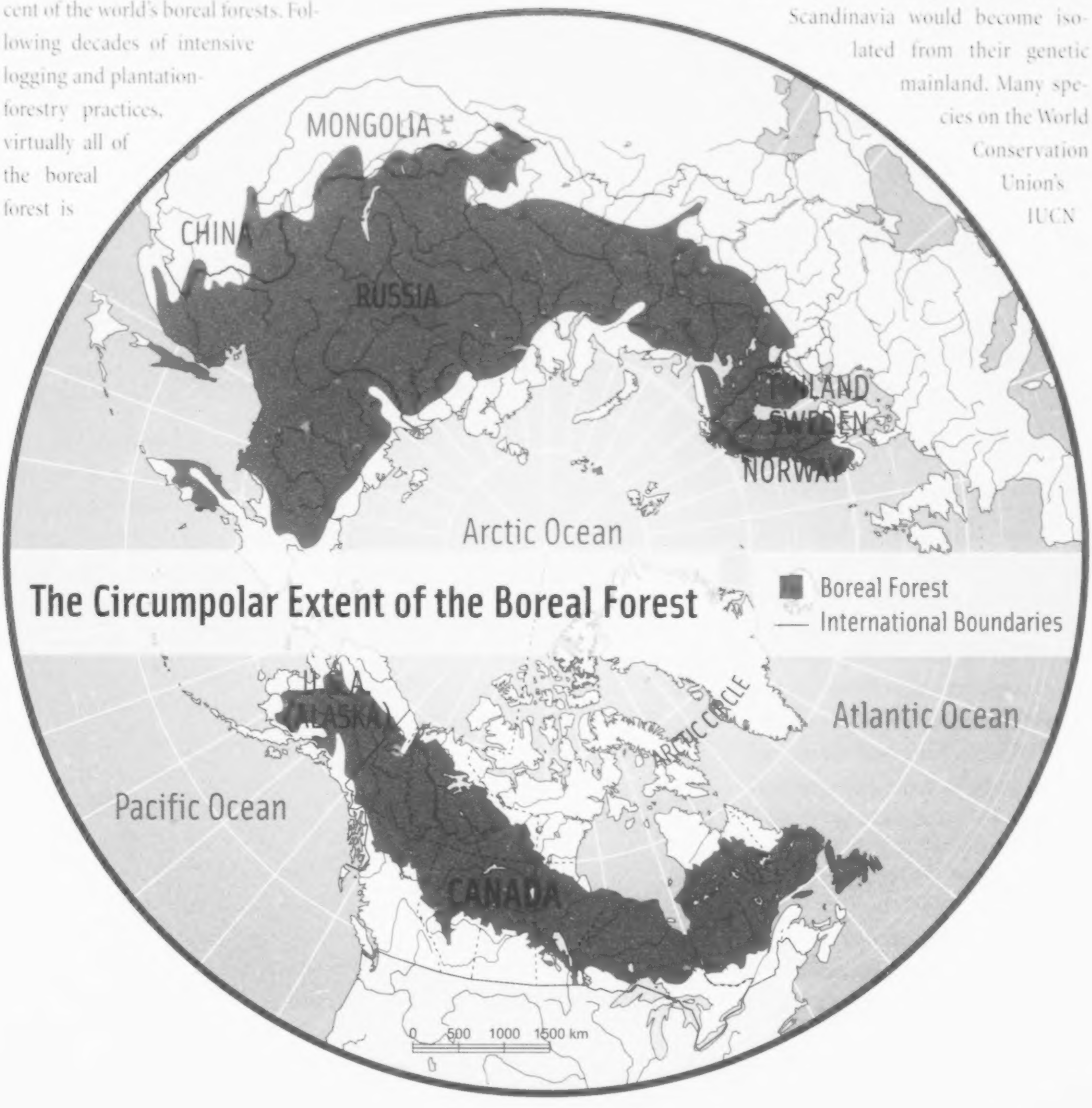
GLOBAL CONTEXT

The western extent of the North American boreal forest covers inland Alaska. According to Alaska's Department of Commerce, Community and Economic Development, the state's boreal forest covers 42.8 million hectares and constitutes about one third of Alaska's forest land (the other two thirds are coastal rainforest). Some 9.1 million hectares of Alaska's boreal woodland are currently considered commercial. The main species are white spruce, black spruce, birch, aspen and balsam poplar (cottonwood). Relatively little of Alaska's commercial timber harvest takes place in the boreal area. The industry in this forest is limited to small mills and cottage industries, although interest is increasing and the state legislature has enacted laws that may encourage industry growth. The Alaska Forest Association reports that four landholders manage Alaska's forests: the federal government (51%); state and local governments, including the University of Alaska system (25%); Native corporations (24%); and private landowners (0.4%).

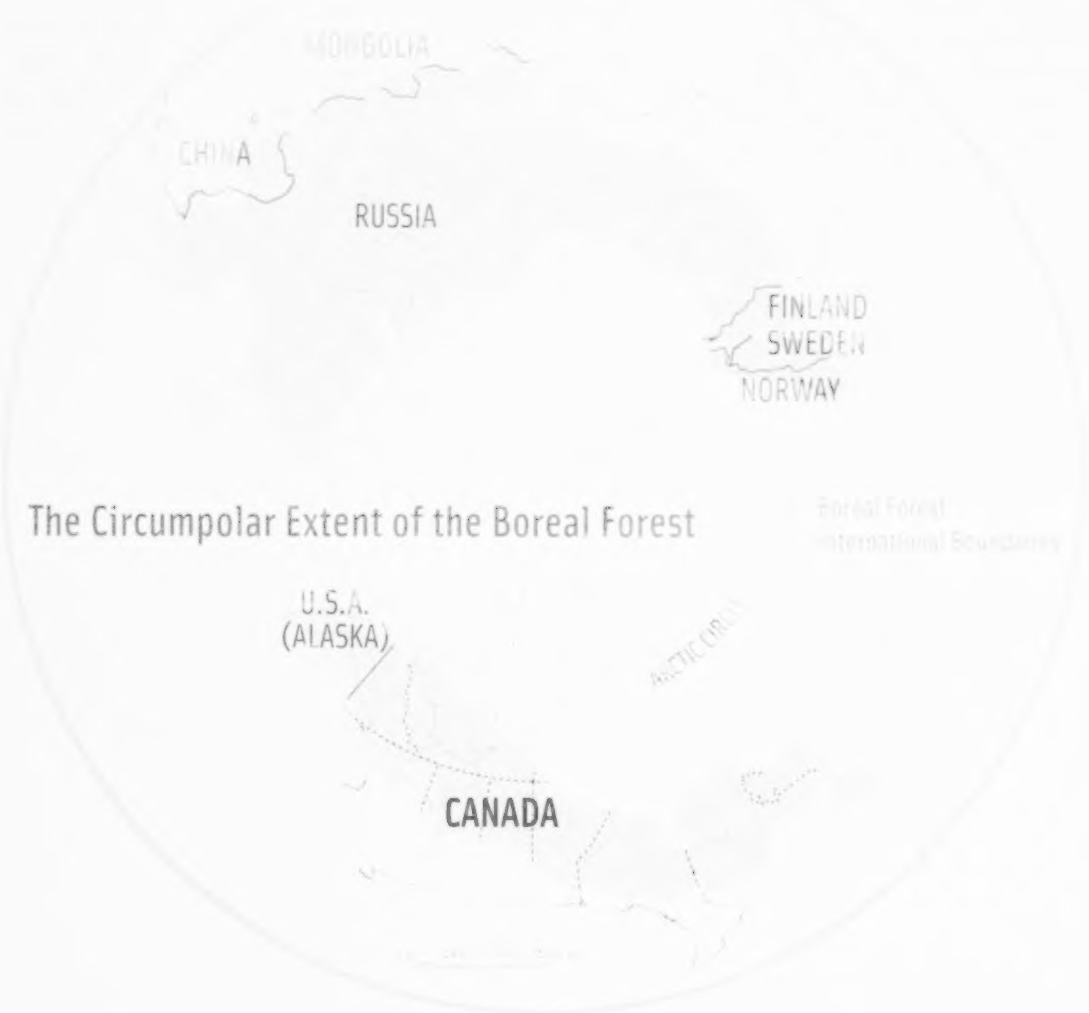
Scandinavia is home to about 10 percent of the world's boreal forests. Following decades of intensive logging and plantation-forestry practices, virtually all of the boreal forest is intensively managed secondary forest. Some hundred years ago, Finland, Norway, Sweden and Denmark introduced legislation that put restrictions on the harvest and called for regeneration efforts to increase timber production. The result has been a doubling of this production but reduced biodiversity. In Sweden, for example, most of the boreal stands are now younger than 100 years and are dominated by even-aged forest, and the once-large deciduous patches have been systematically removed, leaving most of the remaining deciduous trees to occur in young stands.

Russia grows about 60 percent of the world's boreal forests. Ninety-five percent of Russia's woodland is boreal and slightly more than half (55 percent) is commercially viable. The remaining 45 percent is considered unworkable due to environmental constraints and remoteness from domestic and international markets. The Federal Forest Service of Russia manages about 94 percent of the country's total forest land area.

A green belt runs along the Finnish-Russian border connecting the continental Russian taiga to the more oceanic boreal forests of Scandinavia. Without this ecological bridge the forests of Scandinavia would become isolated from their genetic mainland. Many species on the World Conservation Union's IUCN



The Circumpolar Extent of the Boreal Forest



The Circumpolar Extent of the Boreal Forest

MONGOLIA
CHINA
RUSSIA
FINLAND
SWEDEN
NORWAY
Boreal Forest
International Boundaries
U.S.A.
(ALASKA)
ARCTIC CIRCLE
CANADA

Burn Areas Recover on their Own

A study published in *Science* (February 27, 2004) found that wildfires are important ecosystem processes and that burn areas should be left alone to help the area recover.

The article, co-authored by Dr. Fiona Schmiegelow of the University of Alberta, reported that the practice of salvage harvesting to help recoup economic losses following a fire can threaten some organisms when large quantities of biological legacy (such as snags and logs) are removed.

Throughout its life cycle, from standing and downed stages to its inclusion in the litter or soil, dead wood is at the base of ecological processes that involve a wide spectrum of organisms, from vertebrates to decomposer bacteria and fungi.

The study found that catastrophic events, such as wildfire, can help restore an ecosystem that has been depleted by intense human activity, such as certain forestry practices, by re-creating some of the lost structural complexity and landscape diversity. The researchers thus urge more sophisticated management of forests affected by major disturbances. They suggest, for instance, that in areas allocated for timber harvest, the inherent risk of losses due to fire should be factored in, so that the economic consequences of natural disturbances and the perceived need for extensive salvage operations are minimized.

Red List of endangered species for Sweden and Finland still exist in viable populations in the northwest of Russia. This is mainly because Russia's forests in this region have not been subjected to the systematic and intensive forestry methods used in Finland and Sweden.

The boreal forests of North America, Scandinavia and Russia have crowned the planet for millennia. They are the product of natural elements as huge as ice-age glaciers and as minute as insects. Over centuries, these resilient ecosystems have come to welcome major forces such as fire, climate, high winds, drought and floods as part of their life cycle. The important thing now is to ensure that the relatively recent advent of another force—humans—does not constitute an element too powerful for the boreal forest to assimilate.

CREATING A FOREST–FORCES OF NATURE

About 20 000 years ago, a vast ice sheet some 3.2 kilometres thick covered nearly half of North America. Any vegetation that existed was compressed into the ice-free terrain to the south. As the Earth warmed and the glacier receded, trees and plants gradually spread northward, beginning with the spruce and northern pine (about 18 thousand years ago), followed several thousand years later by fir and birch.

Between 12 000 and 9 000 years ago, all of these species co-existed just south of the glacier, which still covered much of Canada. Rapid warming caused the spruce to decline, leaving the northern pines to dominate. Finally, some 5 000 years ago, Canada's boreal forest began to take on its current identity.

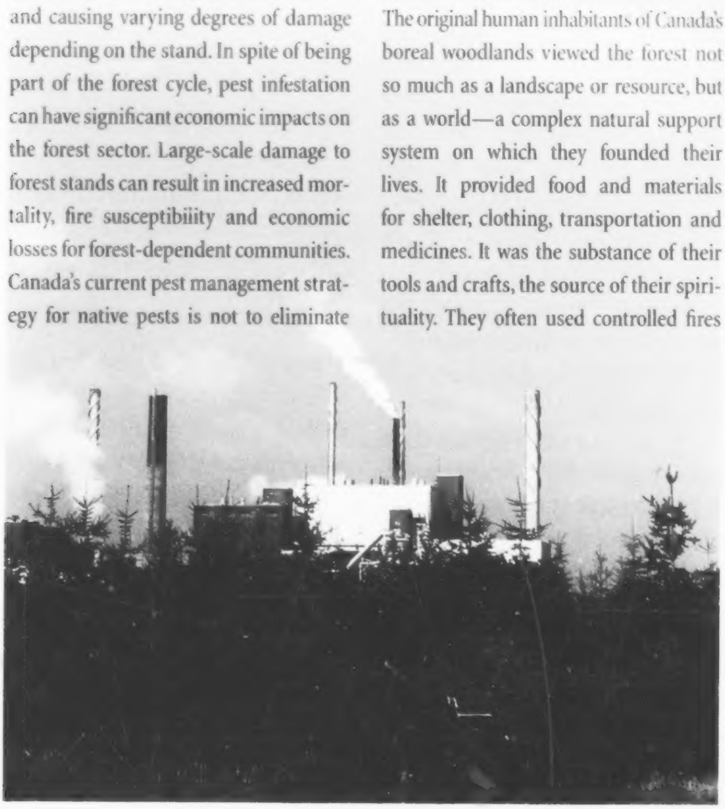
While the glaciers have receded, other massive forces continue to shape the boreal forest mosaic today. Fire, insect attacks and disease occur on a large scale here, much more than in other forest areas, and are the primary sculptors of the boreal forest landscape diversity. These engines of change operate at different times and places across the forest, creating a patchwork or "mosaic" of trees of different size, age and species composition.

Fire is the primary change agent. It is as critical to the health, renewal and survival of the boreal forest as the sun, rain, seasons and other natural phenomena. Forest fires reduce the litter of leaves, logs and needles on the forest floor, and release the nutrients that have been tied up in these materials. The nutrient-rich ash left behind helps to fuel plant growth. Fires also open the canopy to sunlight which, in turn, stimulates regeneration from seeds and roots. Some trees actually require fire to spark their reproductive cycles. The seeds of lodgepole and jack pine, for example, reside in serotinous cones, which are protected by a waxy coating that melts when the heat of a fire affects it, thus releasing the seeds.

The patchy mosaic of plant communities left behind after a fire provides the variety of trees and plant life required to sustain various species of wildlife. The northern caribou, for example, uses jack pine stands of various ages, but tends to over-winter in older stands that maintain high densities of terrestrial and arboreal lichens. Over time and across large landscapes, fire contributes to forest renewal.

Some native insect species too are an important part of boreal ecosystem renewal. They help to decompose litter and eliminate sick or aging trees, thus reducing competition among trees, making the ecosystem more productive, and contributing to the carbon recycling process. Some large insect outbreaks that occur regularly contribute to the boreal forest's life cycle. Outbreaks of spruce budworm occur about every 30 years, lasting varying amounts of time and causing varying degrees of damage depending on the stand. In spite of being part of the forest cycle, pest infestation can have significant economic impacts on the forest sector. Large-scale damage to forest stands can result in increased mortality, fire susceptibiiity and economic losses for forest-dependent communities. Canada's current pest management strategy for native pests is not to eliminate them, but to keep the most vulnerable stands alive during the outbreak until the insect's natural enemies can control it.

Like insects and fire, diseases are a normal part of the dynamics of a boreal forest ecosystem. They accelerate the mortality of weakened trees and other plants, and break down dead plant material, thus helping to recycle organic matter. Root diseases are among the most common in the boreal forest. These are often difficult to detect as the fungi that cause them can spread below ground through the root system to other trees, as well as by spores.



CREATING A FOREST—HUMAN FORCES

While nature's forces have been sculpting the boreal forest, a relatively new operative—humans—is increasingly making its mark.

The original human inhabitants of Canada's boreal woodlands viewed the forest not so much as a landscape or resource, but as a world—a complex natural support system on which they founded their lives. It provided food and materials for shelter, clothing, transportation and medicines. It was the substance of their tools and crafts, the source of their spirituality. They often used controlled fires to manage animals and encourage the renewal that plants needed for survival, and to facilitate hunting and travelling.

When the Europeans arrived in eastern North America in the 1670s, they discovered a New World rich in resources. Among these resources were seemingly endless forests offering unprecedented bounty in fur pelts, and later in wood for the timber trade. By the end of the 1800s, as loggers found they had to penetrate farther and farther north and west to find suitable timber, and as the forces of industry marched alongside them, it became apparent that the forest's resources were not, after all, limitless.

In the late 1880s and early 1900s, the growth of a market in eastern Canada and the U.S. spurred demand for paper. Timber exploitation on a large scale occurred somewhat later along Canada's Pacific coast, in the mid-19th century. The global population growth in the latter half of the 20th century, coupled with industrialization, generated increased demand for lumber and pulpwood. At the same time, technology provided loggers with greater forest access and more efficient harvesting tools to exploit forest resources. Other economic activities, such as mining, oil and gas extraction, tourism and recreation, also saw expansive growth. These activities, individually and in combination, place pressure on the boreal forest.

More recently, another human-induced threat has been identified. As global temperatures rise due to increased greenhouse gases in the atmosphere, the resulting changes in climate could significantly alter the evolution of the boreal forest.

Environment Canada statistical models predict that by the middle of this century Canada's annual mean temperatures could

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Throughout its life cycle, from standing and downed stages to its inclusion in the litter or soil, dead wood is at the base of ecological processes that involve a wide spectrum of organisms, from vertebrates to decomposer bacteria and fungi.

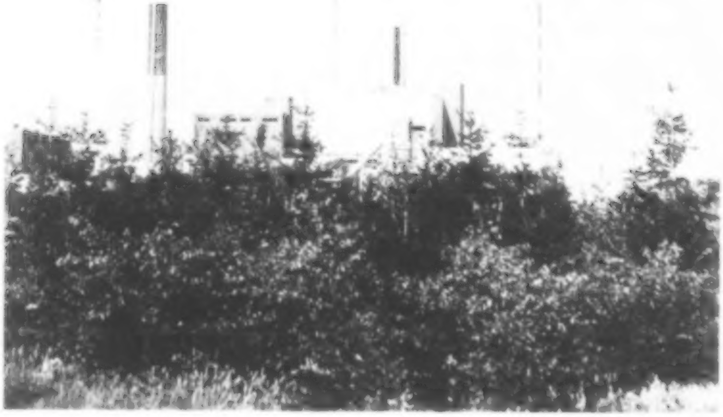
The study found that catastrophic events, such as wildfire, can help restore an ecosystem that has been depleted by intense human activity, such as certain forestry practices, by re-creating some of the lost structural complexity and landscape diversity. The researchers thus urge more sophisticated management of forests affected by major disturbances. They suggest, for instance, that in areas allocated for timber harvest, the inherent risk of losses due to fire should be factored in, so that the economic consequences of natural disturbances and the perceived need for extensive salvage operations are minimized.

[illegible] and causing varying degrees of damage depending on the stand. In spite of being part of the forest cycle, pest infestation can have significant economic impacts on the forest sector. Large-scale damage to forest stands can result in increased mortality, fire susceptibility and economic losses for forest-dependent communities. Canada's current pest management strategy for native pests is not to eliminate

CREATING A FOREST: HUMAN FORCES

[illegible]

The original [illegible] boreal woodlands [illegible] so much as a landscape [illegible] as a world — a complex natural support system on which they founded their lives. It provided food and materials for shelter, clothing, transportation and medicines. It was the substance of their tools and crafts, the source of their spirituality. They often used controlled fires



increase by 3°C to 4°C from the levels they were at in the 1960s, with the most extreme increases (up to 6°) in the Far North. This increase would have a major impact on the boreal forest—more so than on the world's temperate or tropical forests. These impacts include more frequent and severe disturbances such as fire and insects, changes in the quantity and quality of water resources, and a gradual migration northward of the forest itself.

Soils in parts of the boreal forest are underlain by permafrost. In recent years, researchers have observed that permafrost temperatures in forest and tundra regions have risen and the permafrost zone is receding. Other scientists have observed an increase in vegetation productivity at latitudes between 45 and 70 degrees north, and seed production by boreal tree species along the northern boreal tree line is on the rise.

AN INTEGRAL PART OF CANADIAN LIFE

Canada's boreal forest is integral to the country's history, culture, economy and natural environment. Annual tree rings provide a living record of atmospheric conditions and changes in climate. Much of Canada's history is etched in the trails, roads and campsites that mark the lakes, bogs and hills of the boreal forest. The country's economy is buoyed by its industries, and the climate is moderated by its trees. Millions of Canadians live in or near the boreal forest and depend on the surrounding forest and resources for their social and economic sustenance. For millions more Canadians, the boreal forest is a recreational and spiritual refuge, a place to bike, canoe, bird-watch, camp, fish and take photos, or just to look around and breathe the fresh air. Many of Canada's indigenous peoples live in boreal forest communities. To them, the forest is more than an economic mainstay; it is also their home, and the foundation of their social structures and cultural values.

The boreal forest provides food and raw material such as timber, wood fibre, game and fish, and cultural and recreational opportunities, as well as aesthetic, artistic and scientific values. Its genetic diversity offers sources of biological materials such as medicines and compounds for research and pharmaceutical purposes. It mitigates floods and drought during times of extreme (too much or too little) water flows, and its wetland acts as a water filter by trapping and removing impurities from flowing water. Its vegetation contributes to soil retention, erosion control, nutrient cycling and soil formation, and purifies the air by removing pollutants along with carbon dioxide from the air and producing oxygen as a by-product.

While forestry is the main boreal forest industry, many other economic activities also take place in the boreal forest. These include mining, oil and gas extraction, hunting, trapping, fishing, tourism and recreation, and the service industries that support them. Tourism, for example, contributes several billion dollars a year to the economy, and much of the attraction for visitors is the wilderness afforded by the boreal forest.

FOREST MANAGEMENT

Unlike the forests of the United States, Scandinavia and the majority of other nations, most of Canada's forests (93 percent) are publicly owned. The remaining 7 percent are held by private owners.

Slightly more than half of Canada's boreal forest is timber-productive and, of that amount, about half is managed for forestry. The part not managed for timber production is either unavailable because it has been designated as protected areas and reserves, or currently considered inaccessible. About 750 000 hectares—or 0.2 percent of the total boreal forest—are harvested each year. Another 5 to 6 million hectares of boreal forest are disturbed by fire, insect and disease. While the boreal forest, for the most part, regenerates naturally, it is helped when needed by seeding or planting.

Forest management is increasingly undertaken in an open and transparent process. The goal is to provide all members of the forest community with opportunities to voice their views.

Under the *Canadian Constitution Act*, forest management is a provincial/territorial responsibility except on lands such as First Nation reserves, national parks and National Defence sites that are managed by the federal government. Within the boreal forest, the provinces and territories control 92 percent; the federal government, just over 5 percent.

The provinces and territories pursue a balance between the forest's environmental, economic and social values. Based on the concept of "integrated land-use planning," they are moving towards bringing together all parties affected by land use decisions so that they can participate in the decision making and, where appropriate, coordinate their activities and mitigate any negative impacts. These parties include relevant governments, industry sectors, organizations, communities and others who may be affected by the decisions. Taking into account these various voices, the provinces and territories set the policies, legislation and other regulatory matters in support of the sustainable use of the boreal forest resources. For the forest industry, they grant logging licences, set harvest levels, collect stumpage fees and enforce the other regulatory matters that control harvesting procedures. They also consider other sectors and other management values.

The federal government, through its various departments, plays an important role in forest management. This includes management of federal lands, national and international reporting obligations, forest conservation including habitat protection, protection of endangered species, coordination of Aboriginal issues, provision of reliable information and knowledge on forests, and building of national consensus on forestry matters. The federal government, working with the provinces, territories, Aboriginal groups, and industry, helps provide the foundation for keeping the forest industry competitive worldwide, and develops tools with other nations to help measure forest sustainability around the globe. The Canadian Forest Service (CFS) of Natural Resources Canada is the federal agency charged with forest responsibilities.

The federal/provincial/territorial forestry relationship is one of coordination, cooperation and partnership. An important coordinating instrument is the Canadian Council of Forest Ministers (CCFM), created in 1985 to provide leadership on national and international issues and set direction for sustainable forest management. For example, it led the development of the first three national forest strategies, starting in 1992. The CCFM continues to work on initiatives such as the National Forest Information System (NFIS) and criteria and indicators (C&I) to access and report information on Canada's forests.

Forest companies share in the responsibility for forest management. Companies with long-term licences to forest land pay cutting fees to the appropriate provincial/territorial government, and produce plans to carry out sustainable management in return for harvesting timber. These management plans must be submitted to the provincial/territorial government for approval before harvesting can take place. The plans detail how forest values will be conserved, and identify, on a map, the areas to be harvested. The plans are updated regularly.

Aboriginal peoples' involvement in sustainable forest management is increasing, shaped by a combination of self-government agreements, land claim treaties, court rulings, and government policies and practices. These processes and activities recognize the historical and fundamental connection of many Aboriginal peoples to forest ecosystems. (For information on initiatives to increase Aboriginal involvement in boreal forest decision making, see text box on page 58.)

BENEFITS OF THE BOREAL FOREST

Canada's boreal forest offers an array of benefits—aesthetic, cultural, economic, environmental, historical, recreational and spiritual. It also serves many users, from communities to individual Canadians to industries. The terms "multiple benefits," "multiple values" and "multiple users" have become inseparable from boreal forest land use discussions.

Several voices speak for these multiple expectations. Environmentalists are calling for increasing amounts of land to be set aside from development. The forest industry requires sufficient timber to meet increased demand and to remain profitable in a world of escalating competition. Other industries, such as mining and energy, are mainly located in the boreal region. For example, 64 percent of the petroleum produced in Canada comes from that region and this percentage increases every year. The people who work in these industries may also wish to have a voice. Millions of Canadians, including the majority of Canada's Aboriginal communities, live in or near the boreal forest, and it is important that these populations share in the responsibilities, decisions and benefits of the land. All Canadians, whether they live in boreal areas or not, increasingly want a say in how their forests are managed.

While the various voices may advocate apparently conflicting views, their demands are not necessarily mutually exclusive. The environmental, economic and social perspectives work alongside each other in the notion of sustainable development, a concept fully embraced in Canada's National Forest Strategy and Forest Accord. And several innovative approaches, from state-of-the-art science and technology to alliances of previously unlikely parties, are emerging to find common ground.

The need, as the Senate Subcommittee on the Boreal Forest (1992) put it, is "to meet the competing realities of preserving the resource, maintaining the lifestyle and values of boreal communities, extracting economic wealth, and preserving ecological values." The key to achieving these multiple expectations is innovative management and approaches based on sound science.

ENVIRONMENTAL BENEFITS

Canada's boreal forest, covering 30 percent of its total land area, produces oxygen, filters clean air and water, stores carbon, moderates climate, and protects against soil erosion. It is also a biodiversity reservoir with an abundance of plant, animal and other species that in many cases are unique to this area. To maintain these environmental benefits, the biodiversity of the various species and ecosystems must be protected. And, while the boreal forest is a resilient ecosystem, it faces several threats that could undermine its natural balance. Three of these threats are outlined below, each with examples of initiatives to minimize and/or adapt to its impacts: habitat loss and fragmentation, insect pests, and climate change. Several measures are in place to address these dangers. They include setting aside more protected areas, developing environmentally benign alternatives to pesticides, and examining the effects of climate change on the boreal forest and finding ways to adapt to these impacts.

Habitat Loss and Protection

Habitat loss is considered by some forest professionals to be the greatest cause of declining biodiversity in the boreal forest. Habitat loss and fragmentation can be the result of the activities of individual resource sectors or the cumulative effect of many sectors. These activities may include large-scale land uses such as oil, gas and hydro-electric development; mining, power and pipeline corridors; agriculture; and roads. Certain forestry activities such as unsustainable harvesting rates can also affect habitat, as can urban growth and air and water pollution.

Conservation may mean different things to different people. Generally it refers to the implementation of measures for the rational use, maintenance and rehabilitation or restoration of natural resources. Protection implies the idea of a threat and refers to regulatory measures, resource management and public education programs aimed at ensuring that ecosystems are maintained in a healthy state.

In Canada, one of the ways that habitat loss is being addressed is through the creation of protected areas—legally established areas, both land and water, that are regulated and managed for conservation objectives. Protected areas include parks, wildlife and forest reserves, wilderness and other conservation areas designated through federal, provincial or territorial legislation. Currently, about 67 million hectares of the total boreal region are protected.

The move to increase the amount of protected land gained momentum in 1992 when the federal, provincial and territorial governments agreed to protect 12 percent of Canada's natural areas in parks or reserves by 2000. While they did not meet the 2000 deadline, they did make considerable progress. In 2002, the federal government made a commitment to significantly expand Canada's national parks system by establishing parks that represent each of the country's 39 natural regions. This National Parks System Plan is just over 60 percent completed.

As of December 2004, Canada had 41 national parks—including 13 located within the boreal region. These parks help to conserve the region's biodiversity. Provincial governments have also created dozens of provincial parks across the boreal forest. Feasibility studies and negotiations are currently under way for the possible establishment of three additional boreal-region national parks, in the Mealy Mountains of Labrador, the Manitoba Lowlands, and the East Arm of Great Slave Lake in the Northwest Territories, as well as for the possible expansion of the region's Nahanni National Park Reserve of Canada. Two other boreal-region national parks have been proposed, one in the Wolf Lake area of Yukon and one in an area still to be determined.

A New Way of Looking at Boreal Forest Protected Areas

Because Canada's boreal forest, particularly in the northern latitudes, supports some of the world's most extensive forests, it presents an unparalleled opportunity for proactive conservation planning. The Canadian Boreal Ecosystem Assessment of Conservation Networks (BEACONs) Project was initiated to develop a new conceptual framework for conservation planning in the boreal forest and taiga areas. It proposes a reverse-matrix model in which the wilderness forms the matrix, and human communities and industrial activity areas exist as islands within it, connected by roads or other travel routes. This reduces the need for traditional protected-area design issues such as size, representation and connectivity. BEACONs is a project of the University of Alberta and the Canadian Boreal Initiative, an independent organization working with conservationists, industry, Aboriginal groups and other interested parties to conserve Canada's boreal region.

Another way to reduce habitat loss is to make land use decisions based on the multiple values and goals of all members of the forest community; this may include consultation with various members of the community. A case in point is the conservation and land-use planning process currently under way in the Northwest Territories (although it is still too early to know whether this process will be successful in reducing habitat loss). This process is designed to identify and establish a network of protected areas along with the development of the Mackenzie Valley pipeline. The N.W.T. Protected Areas Strategy involves a partnership of eight Aboriginal organizations, the territorial and federal governments, environmental organizations, and representatives of the oil, gas and mining industries. In December 2004, the federal government made a commitment to pay half the estimated $18-million cost of the collaborative conservation planning process, and the N.W.T. government and ENGOs (Environmental NGOs) have committed to paying the other half.

Reserving representative portions of forest ecosystems under some form of "protection" is a fundamental component of any biodiversity conservation strategy and even of sustainable forest management.

Protected areas, as defined by the World Conservation Union (IUCN), are the cornerstones of conservation strategies. However, the effectiveness and integrity of these protected areas depend in part on conservation activities beyond their borders.

The integration of protected areas into the surrounding landscape using an ecosystem-based approach that combines adaptive management and economic incentives with conservation and participation of local people is increasingly becoming viewed as a conservation alternative to "islands." These "conservation lands," managed to meet objectives that directly or indirectly contribute to the maintenance of biodiversity, can be mapped and evaluated for their effectiveness in conserving biodiversity.

The designation of World Heritage Sites by UNESCO (the United Nations Educational, Scientific and Cultural Organisation) also protects habitat. This designation helps countries safeguard cultural and natural heritage sites around the world that are considered to be of outstanding value to humanity. Canada

BENEFITS OF THE BOREAL FOREST

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[illegible] committee on [illegible] to meet [illegible] ving the

Conservation can mean [illegible] to different people [illegible] the implementation [illegible] rational use, m[illegible] tion or restoration [illegible] Protection implies [illegible] refers to regul[illegible] management and [illegible] grams aimed at ensuring that ecosystems are maintained in a healthy state.

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NRTEE Reports on Boreal Forest Conservation and Development

The National Round Table on the Environment and the Economy (NRTEE) is scheduled to release a *State of the Debate* report on Canada's boreal forest in September 2005. The report will summarize the economic, environmental and social importance of the boreal forest; identify key challenges to achieving the balance between conservation and development in the region; and make a set of recommendations aimed at governments and other stakeholders.

As background to the *State of the Debate* report, the NRTEE commissioned a series of case studies to inform the work of the Boreal Forest Task Force. The three areas examined are the Muskwa-Kechika Management Area in British Columbia, the Alberta-Pacific Management Agreement Area in Alberta, and the Abitibi Region in Quebec. Each study examines how regulatory and fiscal policy frameworks can be improved to advance conservation in each region.

The NRTEE also commissioned another background report that looks specifically at Aboriginal peoples' experiences in the boreal forest. It summarizes key challenges and opportunities for Aboriginal peoples in boreal resource planning and management, and makes recommendations for further engaging Aboriginal peoples in the region's future.

Summaries of these background documents are available on the NRTEE web site at http://www.nrtee-trnee.ca.

has 13 such designated areas. They are a combination of national and provincial parks and historic sites. Another 11 sites are on Canada's Tentative List (a list of sites that may become World Heritage Sites). In April 2004, the most recent addition to the Tentative List, the Atikaki-Woodland Caribou Wilderness Area, was announced. The area straddles the Manitoba-Ontario border and includes the adjoining Woodland Caribou Wilderness Provincial Park in Ontario and the Atikaki Provincial Park in Manitoba. Typical of Canadian Shield boreal forest, it is a landscape of ancient granite outcrops, lakes, rivers, marshes and muskeg, interspersed with pine, spruce and poplar forest. It is also the traditional home of the Ojibway people. The Boreal Heritage Initiative will provide interim protection for the site.

Insect Pests and Pest Management

Insect pests, too, represent a possible threat to the boreal forest. In these northern woodlands, insect pests cause timber losses exceeding 100 million cubic metres a year, a volume equal to more than five times Quebec's yearly timber production.

While native insects are part of the forest's life cycle, foreign species pose a serious threat, as they generally have no natural predators or parasites in the forest to halt their progress, and the indigenous trees and plants have no resistance to them. One such foreign pest is the Larch casebearer, originally from Europe and now found in the boreal forests of eastern Canada and southeastern B.C. The threats posed by invasive alien species are expected to escalate as the global movement of crops, vehicles and people increases, and as average temperatures rise, making Canada's climate more suitable for the survival of some pests.

Native species, too, can cause considerable harm. An outbreak of the indigenous mountain pine beetle is currently taking place in British Columbia and to a lesser extent in Alberta; it is considered to be the largest mountain pine beetle epidemic in North America's history. Starting in central interior B.C. in 1993 and more recently spreading closer to the boreal forest, the epidemic has, according to B.C. government reports, so far killed some 283 million cubic metres of timber. The outbreak has been exacerbated by a lack of sufficiently cold winters that would have killed, or at least reduced, populations. The province also reports that the economic repercussions will be felt by some 25 000 families in 30 communities.

A large-scale effort has been mounted by federal/provincial governments, research institutes, First Nations, academic institutions and industry to halt the outbreak. The Mountain Pine Beetle Initiative focuses on research and forest management options to improve mitigation efforts, reduce the risk of future epidemics, help rehabilitate affected forest lands, and consider response options in non-commercial forest lands.

The Initiative dovetails with provincial measures such as British Columbia's 2005-2010 action plan, which includes recovering dead timber, reducing damage, and restoring forest resources in affected areas, and a B.C./Alberta agreement signed in April 2005 to cooperate in minimizing the spread of the epidemic into Alberta. British Columbia has set aside more than $130 million in its 2005 budget to address the pine beetle epidemic.

Other destructive native insect species are the white pine weevil and the spruce budworm. The white pine weevil attacks mainly white pine and Norway spruce in eastern Canada, and Sitka, white and

Engelmann spruce in the west. This beetle has become so prevalent in Quebec that Norway spruce and white pine are seldom used in that province for reforestation. Sitka spruce has suffered a similar fate in British Columbia.

Spruce budworm outbreaks occur about every 30 years. Some trees, such as spruces, are more resistant to attacks than others, such as firs. The last major spruce budworm outbreak began in the late 1960s and at its peak in 1975 resulted in the defoliation of 54 million hectares of forest in eastern Canada. The budworm outbreak continued in the 1990s and later in western Canada. Canadian Forest Service researchers have been studying this insect for almost a century. Current research addresses population dynamics, behaviour, simulation models and decision support systems.

Researchers are investigating environmentally benign ways to control insect outbreaks, in all Canadian forest types. A promising area is biological pest control—the use of living organisms to limit the proliferation or destructiveness of insects. For example, CFS researchers have genetically altered naturally occurring viruses such as *Bacillus thuringiensis*, or B.t., so that they kill the insect pest more quickly, thus reducing the harm an outbreak can cause. The researchers are now pursuing the next step, which involves finding ways to produce a self-limiting virus that dies with the host insect. Other researchers, such as those at the Pacific Agri-Food Research Centre at Summerland, B.C., have developed molecular technologies to identify and eliminate fungal diseases, which until now have been difficult to detect.

The genetic alteration of trees to enable them to resist insect attacks is another non-chemical approach to controlling outbreaks. The CFS is the main Canadian organization involved in forest biotechnology research, which focuses on biological pest control and tree improvement through genetic engineering. The overall goal is to improve forest productivity, generation and protection. No genetically altered tree has yet been developed in Canada, however, and none are growing outside strictly controlled research areas.

Climate Change

Many scientists believe that climate change could greatly affect the boreal forest. While some impacts could have positive effects (for example, higher temperatures could enhance tree growth), the overall effect, especially when combined with other forest stresses (like fire and pest outbreaks), is expected to be negative. The forest industry and forest-dependent communities may have to adapt to changing conditions as a result of climate change. A significant research effort is under way to assess the nature and magnitude of climate change impacts on the boreal forest and to develop adaptation techniques and strategies.

The Canadian Climate Impacts and Adaptation Research Network (C-CIARN) facilitates the generation of new climate change knowledge by bringing researchers together with decision makers from industry, governments and non-governmental organizations to address key issues related to forestry, agriculture, water resources, coastal zone, health, fisheries and landscape hazards. One of the

Spruce Budworm Decision Support System (SBWDSS)

The SBWDSS is a computer-based system that links inventory data and spruce budworm outbreak information to help foresters plan and carry out management activities to reduce the damage caused by outbreaks. Although developed in 1992 by the Canadian Forest Service, it was first used operationally in Saskatchewan, where it has played a central role in planning for the past three years and where, in 2003, the budworm population was successfully reduced in most areas after treatment. The SBWDSS is also being implemented in New Brunswick and in parts of Quebec, Ontario and Alberta.

The integration of inventory data and spruce budworm outbreak information allows managers to plan spraying programs and optimize harvest schedules. The SBWDSS determines a budworm loss value (m^3/ha) for each forest stand. This information is then used to improve harvest schedules to reduce the amount of loss in the next outbreak. The information also guides protection programs (insecticide spraying) by providing protection priorities. The system also allows forest managers to evaluate the effects of different protection policies and practices.

Currently, researchers at the University of New Brunswick are using the SBWDSS to quantify the effect of outbreaks on carbon sequestration directly associated with pesticide applications, and to design management strategies for the emulation of natural disturbances.

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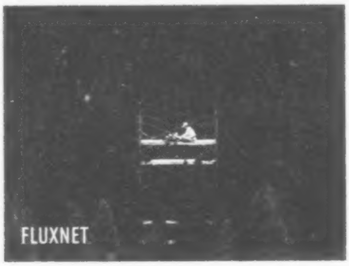

many forestry projects that form part of this national network is Climate Change Impacts on the Productivity and Health of Aspen (CIPHA).

The CIPHA study is examining the impact of disease, insect and other disturbances on aspen, a commercially important poplar species that is prevalent in the boreal forest. The project involves a network of 150 research plots in 25 climatically sensitive areas across western Canada, where the health of aspen forests is assessed yearly. At a Saskatchewan study area, researchers are examining how aspen forests respond under a drought-prone climate, and the results of these initiatives are being used to develop a computer model of aspen growth and dieback that can be applied over time periods of up to one century. Increased frequency and severity of drought are one of the predicted impacts of climate change for parts of the boreal forest. How these forests respond to the stress of changing climate will be important to both forest health and the forest economy.

Other examples of impact research are the CFS ECOLEAP project (Extended Collaboration for Linking Ecophysiology and Forest Productivity), which studies the effects of climate change on forest productivity, and the Fluxnet Canada Research Network, which is examining the effects of climate and disturbances on the exchange of carbon between the atmosphere and forests and peatlands. Researchers use computerized instruments mounted on towers in the forest to record the exchange of carbon dioxide, water vapour and energy, in order to better understand the effects of climate variability on ecosystem production.

By gaining a better understanding of climate-ecosystem dynamics and the vulnerability of forests to climate change, researchers will be better able to inform policy makers, industry and communities of the impacts of climate change. This in turn can lead to the development of better adaptation strategies.

Some forest management activities required to address climate change are already part of current actions. The options are many and varied, ranging from developing new technologies to introducing new tree species to relocating forestry operations. In other cases, new strategies and management plans will need to incorporate the changes brought on by climate change. Planned adaptation, whereby future changes are anticipated and forestry practices such as harvesting and silviculture are adjusted accordingly, could significantly reduce losses from climate change. Such activities could include planting more drought-tolerant species in a region where climate change is predicted to increase the degree and severity of drought, or selecting seeds from provenances that are adapted to wide temperature range to reduce plant susceptibility to extreme weather fluctuations. But uncertainties regarding the timing, location and magnitude of climate change impacts present a challenge to incorporating this knowledge into forest management planning and practices.

More research to improve our understanding of the impacts of active forest management on the effects of climate change is needed. Examining options to reduce the vulnerability of forests to fire and insect disturbances, improving the adaptive capacity of forest managers and other stakeholders; identifying new opportunities for forestry, such as enhancing the commercial value of forests in northern areas and the potential role of biotechnology; and improving communication of knowledge and research—all of these will help ensure that the forest and forestry community will be prepared to address probable climate change.

ECONOMIC BENEFITS

While Canadians want their boreal forest protected, they also want to enjoy the products and economic returns that flow from it. These benefits emanate from several sectors operating in the boreal forest (oil and gas, minerals, metals and hydroelectricity); however, this section focuses on the forest industry. It discusses the economic importance of the industry, two significant challenges facing forest managers (meeting increased consumer demand and escalating global competition), and some of the initiatives under way to address these challenges.

The forest industry is one of Canada's most important economic engines. While about 0.3 percent of Canada's commercial forest is harvested, the economic return on this harvest is considerable. In 2004, the forest industry constituted $35.9 billion (or 3%) of Canada's gross domestic product. It exported $44.6 billion in wood, pulp and paper products, and employed over 900 000 individuals in direct and indirect jobs. About half of the country's wood harvest comes from the boreal forest.

The forest industry constitutes the economic backbone of many rural, remote and forest-based communities. An estimated 2.5 million people live in approximately 522 boreal-forest-dependent communities (where at least 20 percent of the community's economy comes from the boreal forest).

The wood and paper products that emanate from the boreal forest are an integral part of daily Canadian living. While lumber and paper are by far the most economically significant products (earning almost $17 billion and $15 billion respectively in 2004), others range from railway ties and hockey sticks to paperboard boxes and mousetraps, and countless more.

The challenge for forest managers is to ensure that the forest industry continues to provide products and economic benefits for Canadians while, at the same time, protecting the environmental integrity of the forest and the social and other values it offers. For industry, this means finding ways to meet the rising global demand for products and remaining competitive in the global market, while accommodating the need for increased forest protection and conservation.

The increased global demand for wood and paper products poses a particular threat to the boreal forest. For many decades, the relatively small size of boreal trees made this forest less attractive than some other forest types as a source of timber. However, as world demand for pulp, paper and wood products grew, particularly over the past 50 years, so too did the demand for boreal timber. This increased demand coincided with escalating demands for other resources in the boreal forest, such as oil and gas, minerals, metals and hydro-electric power, and the use of forests for recreation. The result has been a continued pressure on the boreal forest.

Another challenge facing Canada's forest industry is increased competition. Countries such as Finland, Sweden, New Zealand, Chile, and increasingly China, are developing new sources of wood, growing it faster and selling it cheaper. China, for example, which now accounts for more than 20 percent of the world's plantations, produces more than twice the amount of paper and paperboard that Canada produces. In the solid wood products sector, imports of logs, predominantly from Russia, are increasingly furnishing a Chinese remanufacturing capacity that now exceeds domestic demand in products such as plywood, flooring and wooden furniture. Another region that is significantly changing the dynamics of global wood competition is the Baltic States and the Russian Federation. With more forested area than any other country, including about 60 percent of the world's boreal forest, the Federation is home to a vast and largely untapped forest resource, including almost 55 percent of the world's softwood.

To maintain Canada's position as the leading exporter of forest products, the federal, provincial and territorial governments are working with wood-product associations and the forest industry to diversify Canada's wood-product exports, and to expand offshore market opportunities. Particular emphasis is currently being directed towards China, a growing market that now represents Canada's fourth most important wood-product customer, and an important market for Canada's pulp and paper products. Canadian governments and industry associations are working to further develop this outlet through marketing endeavours such as trade shows, media campaigns, technical training seminars, and initiatives to reduce trade barriers to Canadian wood products.

Canadian officials are also working to reduce the non-tariff trade barriers that could prevent Canadian wood and paper products from entering certain markets. Reducing these barriers has taken

Non-Timber Forest Products

Another way to extract wealth from the boreal forest while protecting its environmental integrity and building on social values is through non-timber forest products (NTFPs). NTFPs are botanical items growing in forests, other than trees, that can be used for food or medicinal, ornamental or industrial purposes. They include, for example, conifer boughs, wild rice, blueberries, medicinal herbs and hundreds more items—possibly as many as 500 across the country. Maple sap products, wild mushrooms and wild fruits are the most important NTFPs for consumption in Canada and abroad.

The current estimated economic output of forest-based foods in the Canadian economy ranges from $725 million to $1.33 billion. Additional future economic potential of forest-based food is between $2 and $7.4 billion per year. Some experts predict that, as entrepreneurs gain increased access to international markets and as international demand for NTFPs grows, it may be possible to double or triple Canada's harvest of NTFP items. Only in recent years has the potential of NTFPs to national and local economies been recognized. Governments and partners are increasingly looking into how the cottage industry can be developed, particularly in boreal forest communities. (For more information, see special article on page 74.)

on new importance since several multilateral trade negotiations have resulted in the reduction of customs tariffs. Non-tariff barriers include codes, standards and eco-labelling requirements, policies regarding recycled content, building codes and factory health regulations. The most powerful tool for fighting these barriers is the framework provided by international agreements.

Another key endeavour for attracting and maintaining customers, both at home and abroad, is certification. In the past two years in particular, certification has become a critical marketing tool and an important part of boreal forest management. Certification allows consumers to buy wood from companies that have demonstrated that their woodlands are sustainably managed. Some governments support certification as part of sustainable management, and may require companies to become certified within a specified number of years. The government of Ontario, for example, insists that forest company licence holders be certified by 2007. The Forest Products Association of Canada requires that all lands under its members' management be certified by one of the three internationally recognized standards in use in Canada by the end of 2006.

Within Canada, there are three certification systems designed specifically for forests, and one generic system that applies to several industries, including forestry. (For more information on the number of companies certified under each system over the last year, see page 14.) All of the standards promote sustainable forest management, each in its own way.

One of the forest-specific systems was developed by the Canadian Standards Association (CSA), in consultation with the forest industry and other stakeholders. The CSA takes public land ownership into consideration and therefore requires a rigorous public participation process. The Canadian Council of Forest Ministers' framework of criteria and indicators of sustainable forest management helps define the requirements of this standard.

The second forest-specific system is the Sustainable Forestry Initiative, developed by the United States forest industry, which takes private land ownership into consideration and addresses associated issues of training, outreach and procurement for private land suppliers.

The Forest Stewardship Council (FSC) system has developed a standard formulated specifically for Canada's boreal forest. The FSC's National Boreal Standard consists of the Council's 10 principles and 56 criteria, with many indicators and verifiers customized

to reflect conditions in the Canadian boreal forest, including recognition of the rights of indigenous peoples.

The generic certification system was developed by the International Organization for Standardization (ISO).

SOCIAL BENEFITS

As well as environmental and economic benefits, the boreal forest bestows social benefits. This term embraces concepts as intangible as spiritual and heritage benefits and as concrete as the survival of boreal communities.

This section discusses the social perspective in terms of Canadians' values regarding their boreal forest and, more specifically, the needs and views of communities that rely on the forest's natural resources for their economic well-being. The task for forest managers is to address these sometimes divergent perspectives while, at the same time, maintaining the environmental integrity of the forest. An important part of achieving this goal is to ensure that individual Canadians and boreal communities have the opportunity to participate meaningfully in decision-making processes.

People's views of the "value" of the boreal forest have evolved considerably. Sustainable development has taken on new dimensions. It has evolved from an expectation of social, economic and environmental benefits, to one that embraces the more intangible benefits associated with non-consumptive forest uses, such as heritage or bequest values and spiritual benefits. It has also moved from the notion of equity between current and future generations to one that embraces the fair distribution of benefits within the current generation and that embodies all forest-related species and the planet as a whole. Also gaining emphasis is the shift from centralized government regulation to community-based solutions and increased public involvement in decision making.

This shift in public values is a central factor in the move by governments to expand decision-making processes so that all parties, including the public, have opportunities to contribute. Management decision making is increasingly "hands-on": most stakeholders, including interested citizens, are demanding and getting a say in the decisions that affect their forests.

Enhanced public involvement is now set out in forest policies and legislation across the country, and public consultations are an understood part of the decision-making process. For example, Quebec's 2004 examination of the management of its public forests involved 39 days of public hearings over two months in 15 cities and three First Nation communities.

However, land use managers are increasingly recognizing that while mechanisms such as public hearings, local citizen committees, sector councils and regional round tables encourage community involvement and provide a platform for outspoken stakeholders, they do not allow all individuals to express their views and they do not always encourage large-scale public dialogue. Many forest experts agree that an important next step in public engagement is to provide mechanisms that allow individual Cana-

Study of Forest Management in Quebec's Public Forests

The Commission for the Study of Public Forest Management in Quebec tabled its report in December 2004, after a year of extensive public hearings and technical meetings. Among its key findings were that the province's public forests are over-harvested, and that the methods used to assess them and to evaluate the maximum sustainable yield in a particular area are inadequate. It proposed five major changes: a move towards ecosystem-based management and completion of the protected area network, allocations that consider tree quality and the accessibility of forest stands in given areas rather than volume-based wood allocations, better-planned silviculture treatments, preparation for the "inevitable consolidation" of the wood product industry, and decentralized forest management.

The Commission recommended that the suggested corrective actions be integrated into the next set of management plans and that the implementation of these plans be postponed for a year (to 2009) to allow this to be accomplished. In the meantime, it recommended that the maximum sustainable yield for fir, spruce, jack pine and larch be reduced by 20 percent across the province. The Commission stated that while caution should be exercised in setting harvesting volumes, care should also be taken to ensure that companies continue to have access to a stable supply base of timber. The Commission also recommended that the government promptly appoint an implementation committee and a Chief Forester. The government of Quebec is already following through on this recommendation.

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dians to present their views and to participate in decision-making processes. These experts also recognize the importance of timely, unbiased and relevant information that allows other stakeholders to explore and understand the implications of various management options.

The views of people living in boreal communities have additional significance, as their lives and livelihoods are directly affected by land use decisions. Hundreds of long-standing communities, ranging from small settlements to cities, exist in Canada's boreal forest. These communities, particularly the smaller ones, need the resources and capacity to contribute to these decisions.

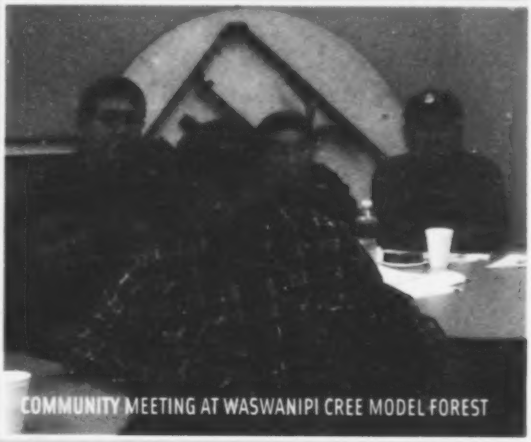
Governments are facilitating involvement of small communities in land use decisions through programs such as the Sustainable Communities Initiative. This program uses the Internet to transmit government information, with a focus on sustainable development and land use, to indigenous and other communities, so that the citizenry has the information necessary to contribute meaningfully to pertinent decisions. One example is the collaboration between the Initiative, Keewaytinook Okimakanak and the Fort Severn First Nation to increase their capacity to utilize computer-generated maps for land use planning, forestry, and mineral exploration. The Initiative is a partnership of eight federal departments and agencies, provincial/territorial and community governments, the private sector and voluntary organizations.

Another way that a number of communities contribute to forest management is through the Model Forest Program. Each model forest is a partnership of groups and individuals, including local communities, representing diverse forest values, with each partner having equal say in the future of the resources they oversee. (For more information on Canada's Model Forest Program, see page 62.)

Initiatives to Increase Aboriginal Involvement in Boreal Forest Decision Making

It is crucial that Aboriginal heritage have a place in land use decisions and that Aboriginal peoples share in the responsibilities, decisions and benefits of boreal forest lands and resources. Innovative partnerships and agreements have made significant inroads in increasing the involvement of Aboriginal people as stakeholders, partners, managers, owners and workers in the boreal forest.

Land claim agreements are a primary tool for increasing Native involvement in the management of Canada's boreal forests. While some land claims are in the negotiation process or in preliminary stages, several have been achieved. For example, in January 2005, the Newfoundland and Labrador government and the Labrador Inuit signed a land claim agreement creating a region of self-government in northern Labrador. The Inuit will own 15 800 square kilometres of land and limited resource and management rights in another 56 700 square kilometres. The land features three distinct sub-Arctic zones, from boreal forest in the south, to taiga in the middle, and tundra in the north. It is also home to the world's largest caribou herd.


COMMUNITY MEETING AT WASWANIPI CREE MODEL FOREST

Another example is the agreement-in-principle signed between the Yukon government and the Kaska First Nation. The landmark solution will ensure a secure supply of timber and manageable economy of scale, create a local market buoyed by long-term tenures, provide new and lasting jobs, and, at the same time, help to ensure the long-term health of the forest ecosystem in the southeast Yukon.

Where agreements could not be reached, the courts have further defined and institutionalized Aboriginal rights and responsibilities in the boreal forest. In November 2004, for example, the Supreme Court of Canada ruled that governments (but not companies) must consult with Aboriginal people about projects that could infringe on disputed land, even if the land claim has not yet been proven. It further ruled that Aboriginal groups cannot veto a government decision made after proper consultation.

Government policies and programs have made important inroads in providing business opportunities and jobs for First Nations. The First Nation Forestry Program (FNFP), for example, helps First Nations build capacity and assume control of the management of their forest resources, establish partnerships with provinces and industry, and participate in off-reserve forestry and other economic development opportunities. The FNFP is a joint initiative of the CFS and Indian and Northern Affairs Canada, managed in partnership with First Nations management committees in each province and territory except Nunavut.

Sustainable Aboriginal Communities research, led by the Sustainable Forest Management Network, helps Aboriginal communities integrate Aboriginal knowledge, values, rights and institutions into sustainable forest management. It also studies the role of sustainable forest management in the social and economic well-being of Aboriginal peoples, and devises structures to foster sustainable Aboriginal communities in forest lands.

The Enhanced Aboriginal Involvement Initiative supports and strengthens the participation of First Nation, non-status Indian and Métis communities in Canada's Model Forest Program to better incorporate Aboriginal knowledge and perspectives into the goals of model forests. It is also designed to increase the participation of Aboriginal Peoples in model forests and socio-economic partnerships that foster sustainable forest management. Projects include documenting traditional ecological knowledge, launching non-timber forest product ventures, and developing Aboriginal forest management plans.

The Waswanipi Cree Model Forest, Canada's newest model forest and the only one led by Aboriginal people, covers more than 209 000 hectares of boreal forest in Quebec's James Bay area. The 13 partners in the model forest include representatives of First Nations, government, industry, academia and non-governmental organizations. The goal is to maintain and enhance the quality of the area to benefit Aboriginal and other users, and to ensure the economic, social and cultural development of the Waswanipi First Nation.

However, while progress is being made, significant impediments (for example, provincial systems of tenure) still hinder the recognition and protection of Aboriginal rights in forest management. The exact nature of the Aboriginal and treaty rights retained by Aboriginal groups on both treaty and non-treaty lands remains a subject of controversy between governments and First Nations. Over the past 25 years, the courts have been asked to define the nature and scope of Aboriginal and treaty rights, and governments' obligations to Aboriginal peoples. These court decisions, as well as the outcome of ongoing treaty negotiations, will have a significant impact on resource developments in the boreal forest.

International bodies and agreements also address the involvement of Aboriginal people in sustainable forest management. These include, for example, the Convention on Biological Diversity, the United Nations Conference on Environment and Development (UNCED)–Forest Principles, and the Draft United Nations Declaration on the Rights of Indigenous Peoples.

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UNLOCKING THE SECRETS OF THE BOREAL FOREST

While demands on the boreal forest have increased, so too have forest research and other initiatives to better understand how the forest works, how its values can be maintained, and how harvesting and other uses can be accommodated in an environmentally sound way. This article discusses some of these initiatives, from scientific research to forest inventories to international agreements and innovative partnerships.

The key to unlocking the secrets of the boreal forest and its riches, while protecting its environmental integrity, lies in a knowledge-centred, innovation-based approach. Forest practitioners have expanded the parameters of forest science research to embrace a wider range of environmental, social and economic considerations.

The quest for more information, such as national inventories, has gained momentum. Foresters are developing increasingly detailed inventories for boreal timber and non-timber resources. Such data will be used to develop computer models and evaluate the impacts of various activities. Forest managers are also working to integrate natural and social sciences, and the traditional scientific knowledge held by Aboriginal and other boreal communities.

Sustainable forest management is so complex and the knowledge needs are so great that no single sector or organization can address the requirements on its own. Innovative partnerships have therefore become key to garnering knowledge, managing activities and sharing information. These partnerships extend not only across sectors and across provinces/territories, but also across borders to other nations.

SCIENCE AND INNOVATION

In Canada, many organizations and agencies pursue forest science and technology. The federal government encourages research in forest management, wildlife, hydrology, fisheries and remote sensing, and other areas. Several provinces and territories conduct research into operational forest management. Academic research is also important: a number of universities have forest chairs and forestry faculties, and many others (including colleges) contribute to forest S&T in engineering, biology, chemistry, mathematics, computer sciences, physics and the social sciences.

The University of Alberta emphasizes boreal research as an important area of study. In March 2005 an NSERC-Université Laval industrial research chair in silviculture and wildlife was created to develop silviculture systems adapted to the boreal forest. Université Laval also holds a Canada Research Chair on Long-term Dynamics and Natural Disturbances of Boreal Forests. This research supports the development of strategies for integrated management of natural and commercial forests and of plans to restore ecosystems affected by human-made disturbances.

The main federal organization conducting forest research is the Canadian

Centre for Northern Forest Ecosystem Research

Ontario's Centre for Northern Forest Ecosystem Research (CNFER) in Thunder Bay is an applied research unit focusing on the effects of forestry practices on boreal ecosystems. Built in 1990, CNFER conducts long-term research on the impacts of full-tree harvesting and on the effects and effectiveness of guidelines designed to protect moose and other wildlife habitat, fish habitat and tourism values. CNFER is now evolving to meet new issues and priorities in forest, fish and wildlife, and water science, with an emphasis on cross-disciplinary approaches.

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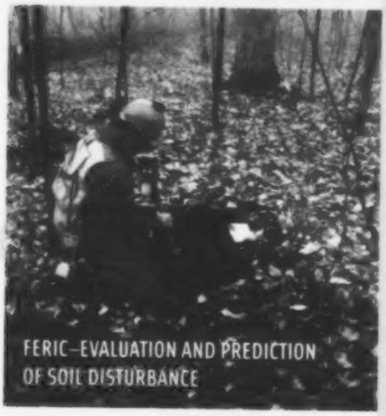
FERIC–EVALUATION AND PREDICTION OF SOIL DISTURBANCE

PAPRICAN–ROLL TESTING FACILITY

Canada's National Forest Research Institutes

Canada has three national industrial forest research institutes. Funded by governments and the private sector, they conduct research and development into wood product development, forest engineering, and pulp and paper technology. All three institutes conduct research that has implications for the boreal forest.

- Forintek Canada Corp. is Canada's national wood products research institute. Its research centres on innovation and technological advancement to enhance the value of Canada's wood products and to keep the forest industry profitable and sustainable. Its research covers forest resource characterization, lumber manufacturing (optimized bucking, sawing, drying, wood protection), wood building systems, composites and value-added products. For example, Forintek examines the impact of forest management decisions on lumber quality and financial return of species grown in the boreal forest. Forintek's research program provides objective information, in an understandable way, about the life-cycle environmental impact of wood as compared to other competing products.
- The Forest Engineering Research Institute of Canada (FERIC) is a private, non-profit research and development organization, and a world leader in the field of operational forest research and development. It works to improve methods of harvesting, tree growth and wood transportation. Its mission is "to provide its members with technology and knowledge to conduct cost-competitive quality operations that respect the environment." Its areas of research focus on the environmental impacts of forest operations, harvesting and regeneration systems, stand tending, and bioenergy in the boreal forest and other forest types.
- The Pulp and Paper Research Institute of Canada (Paprican) is a non-profit research organization, funded principally by Canada's pulp and paper producers. Paprican is a global leader in pulp and paper research, development and application of technologies, and environmental science. Its research program encompasses the fibre value chain, process technologies, product innovation, and sustainability. Areas of focus include system closure, fibre and product quality, pulping, and paper and board manufacture. New research is being directed towards exploiting the characteristics of fibres from the boreal forest in various board and paper products and novel nano-materials, and as a source of biofuels.

Forest Service (CFS) of Natural Resources Canada. For more than a hundred years, the CFS has been studying the nation's forests and providing the sector with leading-edge science and expertise. CFS research focuses on understanding forest ecosystems and developing strategies for advancing sustainable forest management. Areas of research include biotechnology, climate change, forest fires, forest and landscape management, pathology, silviculture and regeneration, and socio-economics. The CFS works with industry, provinces/territories, Aboriginal people and others to develop innovative approaches to sustainable forest management practices; to advance technologies and systems for collecting and integrating information; and to provide scientific, technical and policy advice for national and international initiatives.

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UNLOCKING THE SECRETS OF THE BOREAL FOREST

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required. For example, to make balanced decisions concerning conservation, it is important to know how the concept of connectivity applies in the boreal setting. The effect of climate change is another area requiring boreal-specific study.

Environment Canada's Western Boreal Conservation Initiative (WBCI) looks specifically at the western and northern boreal forest. The western boreal forest has seen an explosive rate of development in the past 15 years, and commercially productive forest lands in Alberta, Saskatchewan and Manitoba have been almost completely allocated to large-scale forestry and other uses, such as oil and gas exploration in Alberta and hydro-electric development in Manitoba. The WBCI is one of seven Ecosystem Initiatives across the country working to achieve ecosystem conservation and protection, especially with regard to migratory birds. It conducts scientific research and monitoring; provides science-based advice; undertakes conservation activities for important habitats and species at risk; and collaborates with universities, industry, governmental and non-governmental agencies, Aboriginal groups and communities.

The Canadian Model Forest Program is particularly successful in partnering for scientific research and sustainable forest management. Seven of the eleven model forests in Canada are located fully or partially in the boreal region. Each model forest is a giant, hands-on laboratory, managed by a group of partners with different perspectives working in close collaboration. The model forests share their information with the forest community and the public across Canada and with model forests in other nations. The research conducted by the seven model boreal forests focuses on the effects of climate change on the levels of sustainable timber harvest in the boreal forest; the ecological and economic impacts of a multi-cohort system for sustainable forest management in coniferous and mixedwood forest types; the impacts of natural disturbances, insects, disease, fire, floods and wind on the boreal forest; and the monitoring and assessing of woodland caribou, bear and moose habitat requirements and management.

Research into the social and economic consequences of actions in the boreal environment is an important and relatively new area of investigation. As in other sectors affecting the natural resource base and environment, Canadians and forest stakeholders must increasingly weigh questions of equity, public good, and aspirations of individuals and communities.

A leader in this area is the Sustainable Forest Management Network (SFM Network), one of 18 Centres of Excellence across the country. The SFM Network delivers new scientific insights into forest sustainability through a comprehensive university-based research program that crosses scientific disciplines and sectors. Hosted by the University of Alberta, the SFM Network has supported extensive research on the boreal forest, focusing on natural disturbance management, policies and institutions for sustainable forest management and Aboriginal communities, and emphasizing integration of social and natural sciences. Several provinces have used Network findings in formulating their forest policies. To ensure its research moves easily into the hands of end users, the SFM Network produces synthesized research documents, maintains a web site, and sponsors workshops that facilitate collaboration between researchers and users.

INDUSTRY, AN ACTIVE RESEARCH PARTNER

The forest industry, through individual companies and through associations such as the Forest Products Association of Canada (FPAC), is an active participant in the quest to unlock the secrets of the boreal forest. For example, FPAC reports that its members, which constitute 75 percent of the industry, spend over $350 million a year on research and development in-house, at industry research institutes (see text box on page 61), and at colleges and universities.

Boreal Criteria and Indicators

A leading innovation in forest management is the criteria and indicators framework. Criteria are the forest values, goods and services that Canadians wish to enhance and sustain. These go beyond traditional timber values to embrace aspects such as wildlife habitat, water quality, community stability, Aboriginal involvement, recreation and biodiversity. The indicators are scientific factors used to assess progress in achieving the criteria. Together, the criteria and indicators provide a framework for describing and measuring the state of forests, the values associated with them, forest management practices, and progress in sustainable forest management. By tracking changes, they provide a valuable tool for targeting research and formulating sustainable forest management policies.

In January 2004, FPAC announced a commitment of $1 million over five years, plus resources in kind, to projects that advance conservation in the boreal region and promote greater understanding of boreal ecosystems. Projects are under way and others continue to be developed in partnership with the Canadian Boreal Initiative (CBI) as part of broader efforts between the two organizations to expand dialogue and jointly identify initiatives to advance boreal conservation. Among the initial projects developed and producing results are research and conservation activities led by World Wildlife Fund Canada and Ducks Unlimited Canada.

The CBI is an ENGO-led example of the innovative partnerships that are increasingly characteristic of boreal forest research. The CBI is an alliance of conservation organizations, resource companies and First Nations that have joined forces to articulate a joint vision and plan for Canada's boreal forests and wetlands. In December 2003, the 11 lead organizations that constitute the Boreal Leadership Council released the Boreal Forest Conservation Framework, which calls for an interconnected network of large-scale protected areas and conservation lands, state-of-the-art sustainable development practices on the remainder of the landscape, and local community and Aboriginal groups engagement on land management decisions.

In September 2003, representatives from the Government of Canada, provincial governments and the forest industry established the Canadian Forest Innovation Council (CFIC), with the endorsement of the Canadian Council of Forest Ministers (CCFM) and the Forest Products Association of Canada. The CFIC is an executive-level body that aims to improve the innovation capacity of the Canadian forest sector, by influencing the research agenda and setting strategic priorities. Since its creation, the CFIC has supported several activities towards the creation of a national forest innovation system that responds to the sector's needs.

INVENTORIES

Credible boreal forest research requires detailed, up-to-date, boreal-specific information. Boreal-specific data are also required to monitor the progress of sustainable development efforts, and to meet national and international reporting commitments. Two initiatives that will contribute to the cache of boreal-specific knowledge are the National Forest Inventory and the National Forest Information System.

Canada's National Forest Inventory (CanFI) is compiled from provincial and territorial inventories aggregated to national standards. The current version, CanFI 2001 (released in 2004), represents the data from 57 agencies. These data have helped define the area of forest and other wooded land in the boreal region, as well as forest type composition and age structure, and the area currently protected in this region.

While this approach is cost-effective and well established, it does not reflect the most current state of the forests and cannot be used as a satisfactory baseline to monitor change. CanFI lacks information on the nature and rate of change to the resource and does not permit projections or forecasts.

To address these limitations, the Canadian Forest Inventory Committee—a subcommittee of the CCFM National Forest Database Program Steering Committee—developed a new approach for a national forest inventory. The new National Forest Inventory (NFI) consists of a plot-based system of permanent observational units located on a national grid.

The new NFI will enable the extent, state and sustainable development of Canada's forests to be monitored promptly and accurately. It will allow for consistent reporting across the country and establish baselines that indicate where the forest resources are and how they are changing over time. In addition, the NFI will support collection of additional data reporting progress towards sustainable development (e.g., socio-economic indicators), as well as data related to forest health (e.g., insect damage, disease infestation), biodiversity and forest productivity. Both these aspects are key to understanding boreal forest dynamics.

Boreal Criteria and Indicators

A leading innovation in forest management is the criteria and indicators framework. Criteria are the forest values, values and services that society wants to enhance and sustain. These go beyond traditional timber values to embrace aspects such as wildlife habitat, water quality, community stability, Aboriginal involvement, recreation and biodiversity. The indicators [illegible] are used to assess progress in achieving the criteria. Together, the criteria and indicators provide a framework for describing and measuring the state of forests, the values associated with them, forest management practices, and progress in sustainable forest management. By tracking changes, they provide a valuable tool for targeting research and formulating sustainable forest management practices.

Keeping track of Canada's forests means pulling together information from across the country. Governments, First Nations, industry and non-governmental organizations all collect data about the forests in their area. Under the CCFM, a new National Forest Information System (NFIS) brings together all of this information on Canada's forests and make it universally available. It will report information on topics such as forest cover, including species, age, volume and disturbance history, transportation infrastructure, silviculture activities, protected areas, relief, and administrative boundaries. The NFI will be available to collaborators, clients and the general public on the internet through the NFIS.

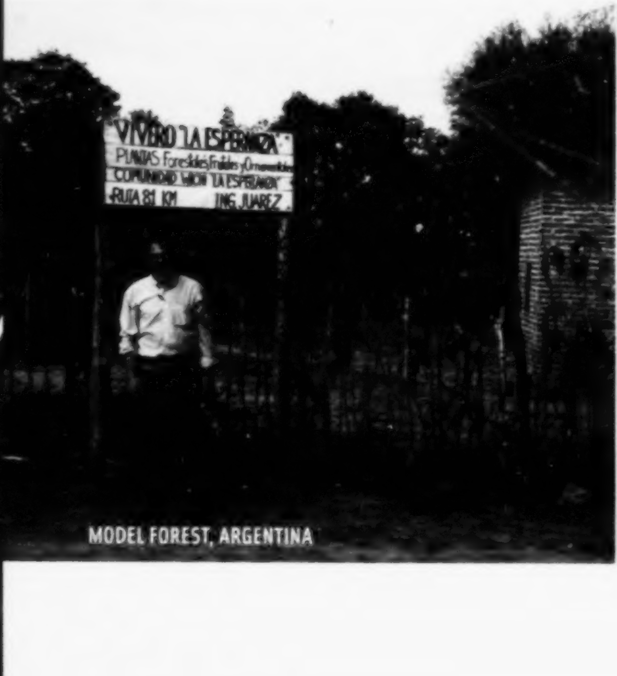
INTERNATIONAL INITIATIVES

Many countries, both boreal and non-boreal, recognize the need to sustainably develop this global resource. Research initiatives cross national and regional boundaries, and emanate from governments, multinational organizations, scientific networks, environmental groups and others. Some are boreal-specific; others are broader, with applications in all forest types.

Indicative of the increasing world attention on the planet's circumpolar forests was the recommendation passed in November 2004 by the World Conservation Union (IUCN), which called on Canada and Russia to protect the health of the boreal forest, undertake conservation planning before development, and respect the rights and interests of Aboriginal people in land use decisions. Canada and Russia endorsed the recommendation as members of the 78-nation IUCN, which includes 112 government agencies, 735 NGOs, and thousands of experts and scientists from 181 countries.

The Model Forest Program, which originated in Canada in 1990, now forms a scientific and information-sharing network in 17 nations and covers a total area of more than 25 million hectares. Several of the 32 model forests that constitute the International Model Forest Network reside in circumpolar forests, and more are planned. The Gassinski Model Forest in the boreal forest of Far Eastern Russia, for example, was created in 1995 and over the past decade has set aside protected habitat for the endangered Siberian tiger, established protected areas for threatened flora, and designed the region's first long-term development strategy focused explicitly on sustainability. Russia is currently developing two more boreal model forests. Another recent addition to the network is Sweden's Vilhelmina Model Forest, officially announced in spring 2004. This new entry is the first of a planned network of model forests in the Barents Region across the northern parts of Sweden, Norway, Finland and Russia. It covers 120 000 hectares, including 58 000 hectares of forest land, northern ecosystems and several indigenous communities. Nine other countries are either in the process of developing model forests or have expressed a strong interest in doing so.

Canada is involved in a range of international forest science and technology initiatives. These include formal collaborative research programs with other nations and working arrangements between individual scientists. For example, Canada participates in the International Boreal Forest Research Association, formed in 1991, to promote


VIVERO LA ESPERANZA
PLANTAS Forestales Frutales y Ornamentales
COMUNIDAD UNION LA ESPERANZA
RUTA 81 KM
ING. JUAREZ

MODEL FOREST, ARGENTINA

PRODUCTORES FORESTALES
ATRI BAJO-CHONCHI
DE ACOPIO DE
OS FORESTALES
A. CARBON VEGETAL, MADERA
RRADA Y OTROS.
NO: 65-630375
PROYECTO
CANCHA DE ACOPIO DE
PRODUCTOS FORESTALES
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FORESTALES DE NATRI BAJO-CHONCHI
CONVOCANTES
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MODEL FOREST, CHILE

and coordinate research into the role of the boreal forest in the global environment, and the International Union of Forestry Research Organizations (IUFRO), a non-profit network that promotes international research related to the well-being of forests and the people who depend on them. The Working Party on Temperate and Boreal Forest Restoration coordinates research aimed at developing new techniques and management approaches for restoring the sustainability of degraded forest landscapes, thereby increasing their environmental, social and economic value.

Canada has taken several steps to advance the international dialogue on key forest issues. These include the Montréal Process on criteria and indicators for the sustainable development of boreal and temperate forests outside Europe. Launched in 1994, the Montréal Process is the largest of nine regional and international C&I systems to guide the monitoring, assessment and reporting of forests and improve forest policies and practices. Its 12 member countries (including Canada, the U.S. and the Russian Federation) span six continents, and account for 90 percent of the world's temperate and boreal forests.

International agreements can make significant contributions to change, and Canada is signatory to several such agreements that pertain to forest management. These include the Convention on Biological Diversity, Framework Convention on Climate Change, Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), Kyoto Protocol, UNCED forestry principles and trade agreements.

The United Nations is an important forum for discussion of international forest issues. Canada participates in several UN-sponsored forums, conventions and other initiatives that impact directly or indirectly on boreal forests. For example, Canada participates in the North American Forest Commission (NAFC), one of six regional forestry commissions under the FAO (the UN Food and Agriculture Organization). The NAFC provides a policy and technical forum for Canada, Mexico and the United States to discuss and address forest issues on a North American basis. As these countries contain a mix of boreal, temperate and tropical ecosystems, the results of the commission's work can be applied more broadly to assist other countries and regions facing similar conditions.

Canada is also a member of the United Nations Forum on Forests (UNFF), established in October 2000. The UNFF is considering the parameters of a mandate for developing a legal framework for all types of forests. Canada has long been a leading proponent of a framework, such as an international forest convention (IFC), that would integrate economic, environmental and social considerations with forest management. Currently, no single international binding agreement exists. Canada's position, shaped in partnership with provincial/territorial governments and considering the views of Aboriginal groups and major Canadian stakeholders, is that an IFC would accelerate progress towards the sustainable management of the world's forests.

Several countries agree that an IFC would be the best way to achieve the sustainable management of the world's forests and increase financial resources for forests. At the 5th UNFF session in May 2005, Canada expressed its desire to achieve an IFC; however, no agreement was reached at the meeting. In the end, it was agreed to postpone negotiations until the next UNFF meeting in February 2006.

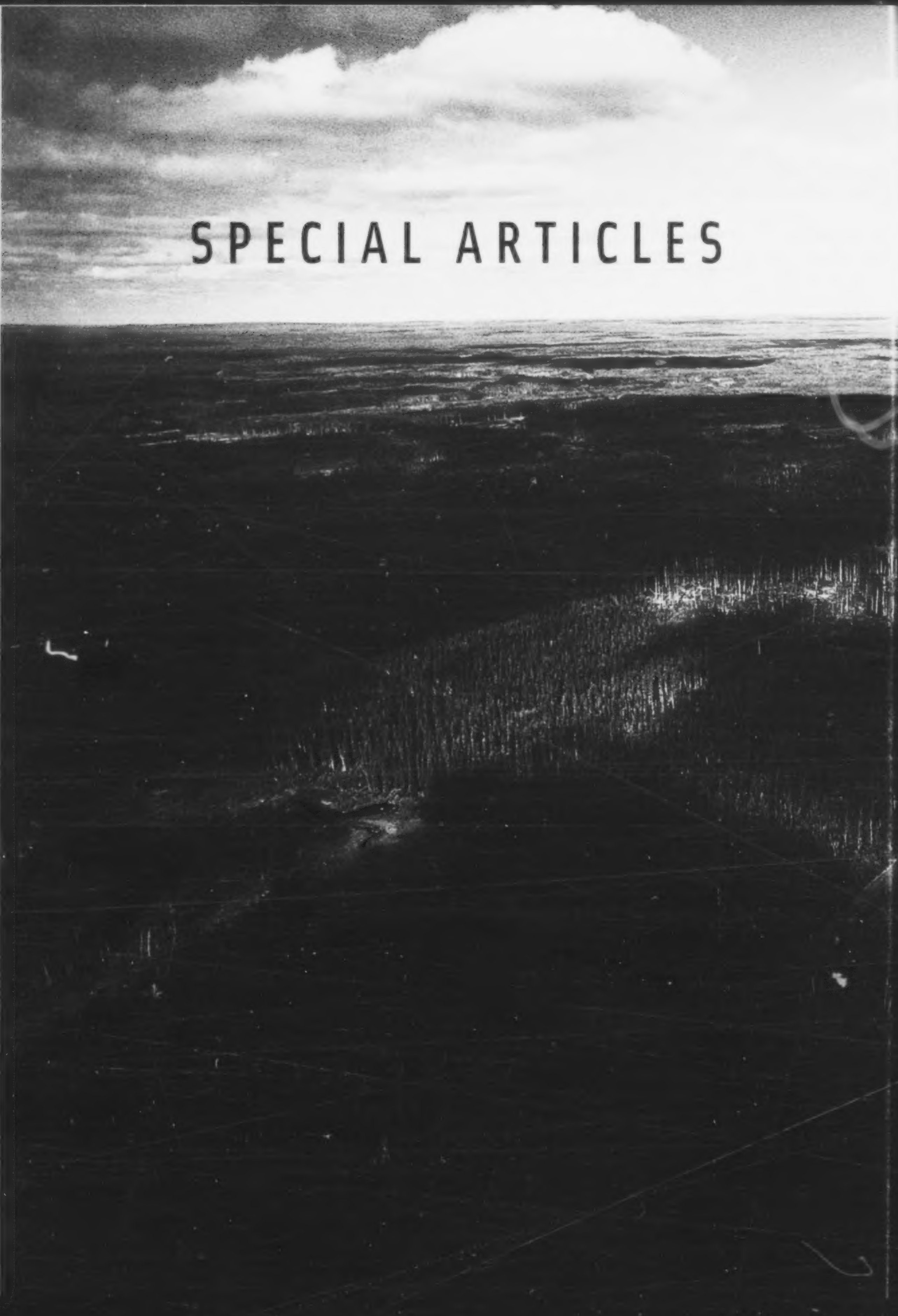
LOOKING AHEAD

Much has been discovered about forests in general and the boreal forest in particular, but much remains to be learned. Research is continuing into areas such as the role of old-growth forests in maintaining ecological processes, the effects of silvicultural regimes and fire suppression, strategies for controlling fire, disease and insects, how species interact with each other and the landscape, how the concept of connectivity applies in the boreal setting, and the effects of climate change in the boreal setting.

Ultimately, Canada's boreal forest needs to continue to provide both habitat for wildlife and a sustainable resource base for people long into the future. All Canadians—from individual citizens to large corporations to governments—need to work together to make wise decisions.

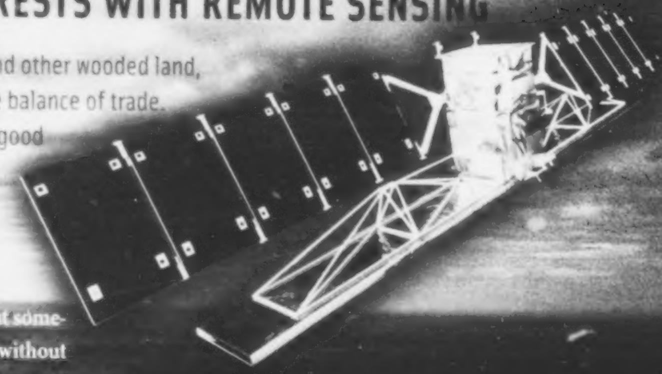
The process for achieving this has already begun: the quest for knowledge, especially boreal-specific knowledge; the building of partnerships and cooperation; and the welcoming of all stakeholders, including the public, into the decision-making processes. The opportunity awaits us.

SPECIAL ARTICLES



MONITORING CANADA'S FORESTS WITH REMOTE SENSING

Canada has over 400 million hectares of forest and other wooded land, and this vast area contributes $34.5 billion to the balance of trade. To ensure that our country continues to exercise good stewardship of this valuable renewable resource, we need current and reliable forest information.



Remote sensing is the collection of information about something, such as the Earth's surface, from a distance without coming into physical contact with it. Examples of remote sensing are aerial photography and Earth observation satellites. Canada has a long history of using remotely sensed data to help monitor and address the sustainability of our forests. In a large nation, remote sensing is sometimes the only way to obtain information on remote locations. Also, remote sensing allows us to apply standardized methods for gathering data across Canada. Remote sensing is being used in many areas of forestry, including forest inventory (http://nfi.cfs.nrcan.gc.ca), forest health, wildland fires (http://cwfis.cfs.nrcan.gc.ca), forest chemistry, forest carbon accounting (http://carbon.cfs.nrcan.gc.ca) and land cover mapping.

Interpreting aerial photographs is a primary information source in the monitoring of Canada's forests, and this is increasingly done digitally. Remote sensing instruments collect data from airborne or space-borne platforms, and images are formed according to the characteristics of the sensor: spatial (size in pixels), spectral (wavelengths), temporal (revisit frequency, or how often a platform passes over a given location) or radiometric (data depth in bits per pixel). By including all of these characteristics, remotely sensed data capture unique information to meet a wide range of information needs.

Data that have low spatial resolution but high temporal resolution are ideal for the creation of map products at frequent intervals to portray the land cover characteristics of Canada; the local detail, however, is often not sufficiently captured. Medium spatial resolution data may be used to map the land cover of large areas while still capturing enough local detail to be generally representative of stand-level conditions, as exemplified by the Earth Observation for Sustainable Development of Forests (EOSD) project. High spatial resolution data allows accurate depiction of individual trees or groups of trees, but typically is only acquired on demand.

Just as differing spatial resolution is an advantage in collecting data, differing spectral resolution also allows for the capture of unique characteristics. Sensors that collect a range of spectral wavelengths or channels can isolate wavelengths specific to particular vegetative conditions. Microwave data, such as that collected by Canada's RADARSAT, can provide information on the structural characteristics of forests.

Provincial and territorial mapping agencies are largely focused on meeting operational needs. Canadian Forest Service (CFS) research is positioned to develop, test and transfer suitable technologies to meet the operational needs of provincial and territorial governments. The CFS pays particular attention to the boreal forest, which is an extensive and important ecosystem. In this region the impact of the new technology is particularly high, since disturbances such as burns and harvest can be more easily monitored, and are often outside of the managed forest areas of the provincial jurisdictions. The CFS remote sensing research projects and applications that follow are applicable to all of Canada's forests.

EARTH OBSERVATION FOR SUSTAINABLE DEVELOPMENT OF FORESTS

To meet national and international reporting requirements, the CFS works with the Canadian Space Agency to use space-based, earth observation technologies to monitor the sustainable development of Canada's forests. The EOSD initiative is producing a land cover map of the forested

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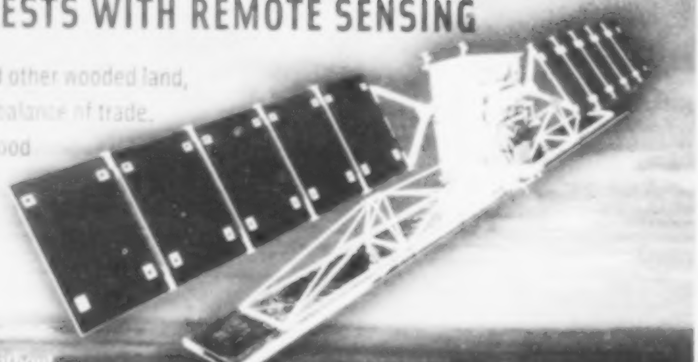

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The short-term goal of EOSD is to complete, during 2006, a land cover map representing forested area conditions present around year 2000. Over the longer term, EOSD aims to produce land cover products (such as maps) that capture changes in forest conditions over time to support national and international reporting requirements. EOSD also conducts research to estimate biomass and develops forest monitoring tools and systems that enable easy access to this rich source of digital information.

INDIVIDUAL TREE CLASSIFICATION

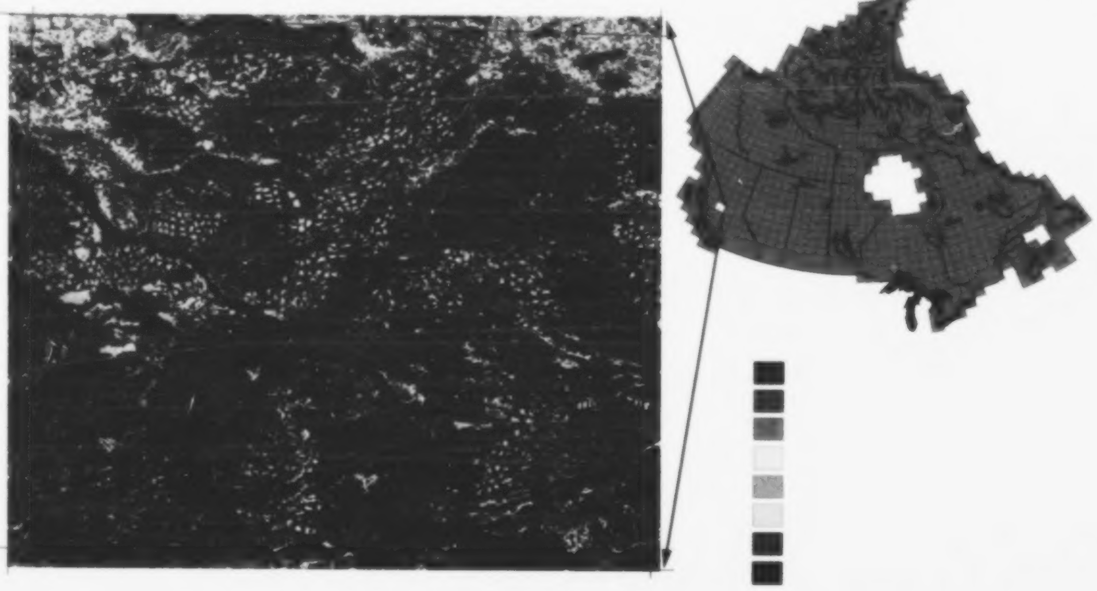
The CFS has developed a range of automated techniques to interpret high spatial resolution images in support of forest management. One of these technologies, an integrated software package called the Individual Tree Crown (ITC) suite, uses high-spatial-resolution, remotely sensed digital images (30-100 cm/pixel) to develop precise stand-based information. This software automatically delineates individual tree crowns, classifies species, aggregates trees into forest stands and generates reports. In addition, the ITC suite gathers new information on crown sizes, gap distribution and stem location. Once trees are located and delineated, further analysis may be undertaken to assign additional attributes such as species or indication of health.

Tested and developed using airborne imagery, the ITC approach is now using new high-spatial-resolution satellite imagery. This technology, which is still being refined, is used commercially by geomatics and forestry companies, as well as provincial governments and international collaborators. The technology has been successfully transferred to the private sector for commercialization.

RADAR REMOTE SENSING OF FORESTS

Canada is not only a forest nation, but also a world leader in the development of remote sensing technologies and applications. In radar remote sensing, microwave signals transmitted from an aircraft or satellite towards the earth interact with and are altered by characteristics such as the shapes, structures and moisture conditions present. These signals are reflected back, recorded at the sensor, and processed into digital imagery. Since radar is an active sensor providing its own illumination (as opposed to relying on the sun), it can acquire imagery under low-light conditions (such as those in Canada's north during the winter) and through clouds. The Canadian Space Agency and industry have partnered to build and operate Canada's first remote sensing satellite, RADARSAT-1. Building upon this first satellite technology, RADARSAT-2, to be launched in the coming years, is a significant advancement in technological

SAMPLE EOSD LAND-COVER CLASSIFICATION PRODUCT OF NECHAKO RIVER, B.C.



capability, with better resolution and multiple polarizations. Its advanced capabilities will require new and more sophisticated analysis methods.

An objective of research into radar by the CFS is to aid the Canadian forestry community in receiving the maximum benefit possible from radar satellites. The forest sector has potential for the application of radar data for forest management (e.g., for mapping land cover and forest change). The advanced capabilities of RADARSAT-2, if developed and transferred appropriately, may play a role in biomass estimation and forest mapping, especially in conjunction with optical satellite sensors.

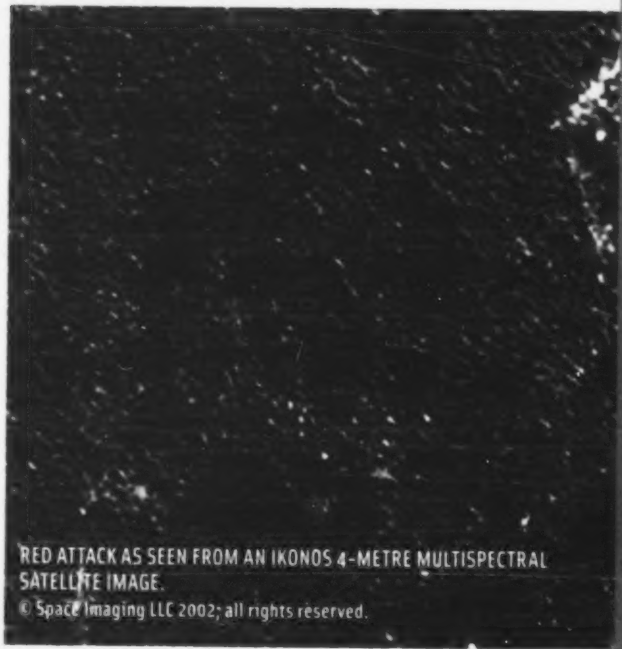
SATELLITE APPLICATION: MAPPING OF MOUNTAIN PINE BEETLE INFESTATION

The current mountain pine beetle outbreak in British Columbia has reached historic proportions (http://mpb.cfs.nrcan.gc.ca). The extent of the outbreak, the rapid rate of its spread and the associated economic impacts have prompted research into new techniques and data sources for reconnaissance and mapping of the infestation. Trees in the red attack stage of infestation have a distinctive red colour, which facilitates their detection by remote sensing instruments. Currently available commercially, high-spatial-resolution satellite data presents opportunities for cost-effective collection of accurate, consistent and timely information on mountain pine beetle impacts. IKONOS multispectral imagery has been used to detect mountain pine beetle red attack at a study site near Prince George, British Columbia. Independent calibration and validation data were collected from 1:20 000 scale aerial photography and used to assess the accuracy of a resulting red attack map. When the results were compared to the independent validation data collected from the aerial photography, it was found that 70 percent of lightly infested and 92 percent of moderately infested red attack sites were correctly identified through the classification of the IKONOS imagery.

HYPERSPECTRAL REMOTE SENSING OF FORESTS

Whereas multispectral sensors typically record reflected light in several broad channels, hyperspectral sensors collect data over a broad spectrum of hundreds of narrow channels. On Canada's west coast, the CFS has demonstrated that hyperspectral imagery can be used to derive maps of forest species (such as Douglas fir and hemlock) where multispectral data can typically only distinguish between forest types (conifer, deciduous, mixedwood). Methods of assessing forest health are being developed by mapping leaf chlorophyll and water content. Foliar nitrogen is also an indicator of forest health: strong relationships have been demonstrated between ground measurements of foliar nitrogen and estimates derived from hyperspectral sensing.

MOUNTAIN PINE BEETLE DEVASTATION IN BRITISH COLUMBIA



RED ATTACK AS SEEN FROM AN IKONOS 4-METRE MULTISPECTRAL SATELLITE IMAGE.

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The detailed spectrum of hyperspectral data adds a new dimension to forest mapping by making it possible to generate new products in the areas of forest inventory, forest chemistry and forest health.

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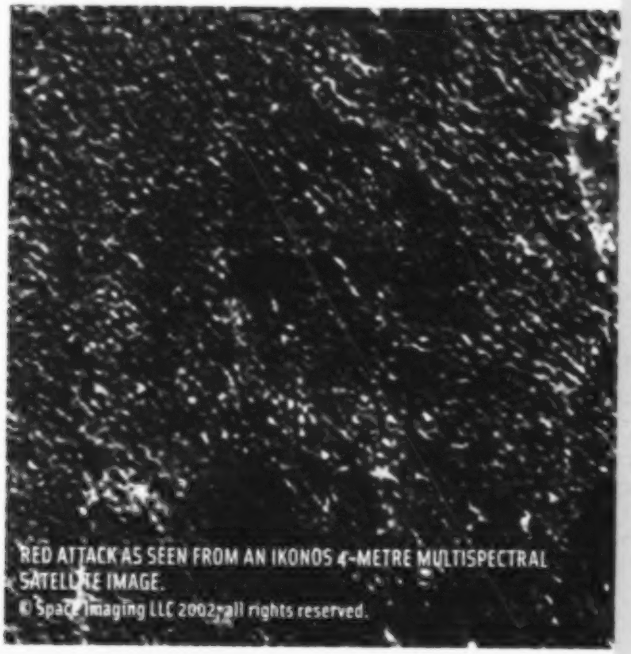

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BOREAL FRESH WATERS

Canada's boreal landscape contains more lakes and rivers than any equivalent land mass on earth. Although the boreal forest has been estimated to include over 1.5 million lakes with surface areas larger than four hectares, no actual inventory has been done. Many of Canada's major river systems pass through the boreal region, including the Athabasca-Peace-Slave-Mackenzie system, and the Churchill and Nelson rivers along with many of their tributaries. The surface area of some parts of the boreal is more than 25 percent water. The world's boreal region also contains vast tracts of wetlands.

The boreal region of Canada contains both soft-water and hard-water lakes and rivers. Soft-water lakes are set in ancient igneous rock of the Canadian Shield, where mineral weathering is low, and the water is similar to rainwater in its chemistry. The soft-water ecosystems occur east of a line that roughly connects the centres of Canada's largest lakes: Great Bear Lake, Great Slave Lake, Lake Athabasca and Lake Winnipeg. All of these lakes have important cold-water sport fishing or commercial fisheries.

To the west of the line, lakes and rivers are set in limestone or sandstone, and generally have hard water. These lakes are shallower than the soft-water lakes, and some are much more productive. Most of the soft-water lakes are oligotrophic (unproductive and low in plant nutrients) in their pristine condition, although many are slightly yellowish in colour as the result of receiving water that has passed through extensive peatlands. Hard-water lakes tend to be eutrophic (productive and rich in plant nutrients), even without human nutrient sources.

There is a strong gradient in precipitation across the boreal region, from very dry conditions in western Canada to humid conditions in the east. In the west, where the Rocky Mountains provide a rain shadow, precipitation can average as little as 400 millimetres per year. The amount increases gradually eastward—1 000 to 1 500 millimetres falls in some parts of eastern Canada. On average, about a third of all annual precipitation falls as winter snow. As a result, river flows and lake levels are usually highest in spring, when the snowpack melts.

FISH POPULATIONS

Most boreal systems contain cold-water species, such as the glacial relicts lake trout, several species of whitefish, and cisco. A number of glacial relict invertebrates share cold-water habitats, including some large crustaceans. In southern parts of the boreal region, where surface waters reach summer temperatures of over 16 degrees Celsius, these species are confined to cold deep waters during the summer. Through much of the southern region of the boreal, warm-water species occur as well. Sport fish include walleye, northern pike, muskellunge and smallmouth bass. In the western boreal streams, mountain whitefish, arctic grayling and bull trout are found.

Boreal aquatic systems contain simple communities. Production of fish is limited by cold water for much of the year and is generally low; many species require 6 to 10 years or more to reach reproductive size. However, some sport fish can reach large sizes by living 20 to 30 years or even longer. As a result of the slow growth rates, boreal fisheries are susceptible to over-exploitation.

DISTURBANCES AND THEIR EFFECTS

Boreal lakes and streams are threatened by a number of human-initiated activities and events, including climate warming, acid precipitation, over-exploitation, nutrient pollution (eutrophication), pollution with mercury and pesticides, and chemical discharges from pulp mills, oilsands developments, base metal mining and other industries.

Climate warming

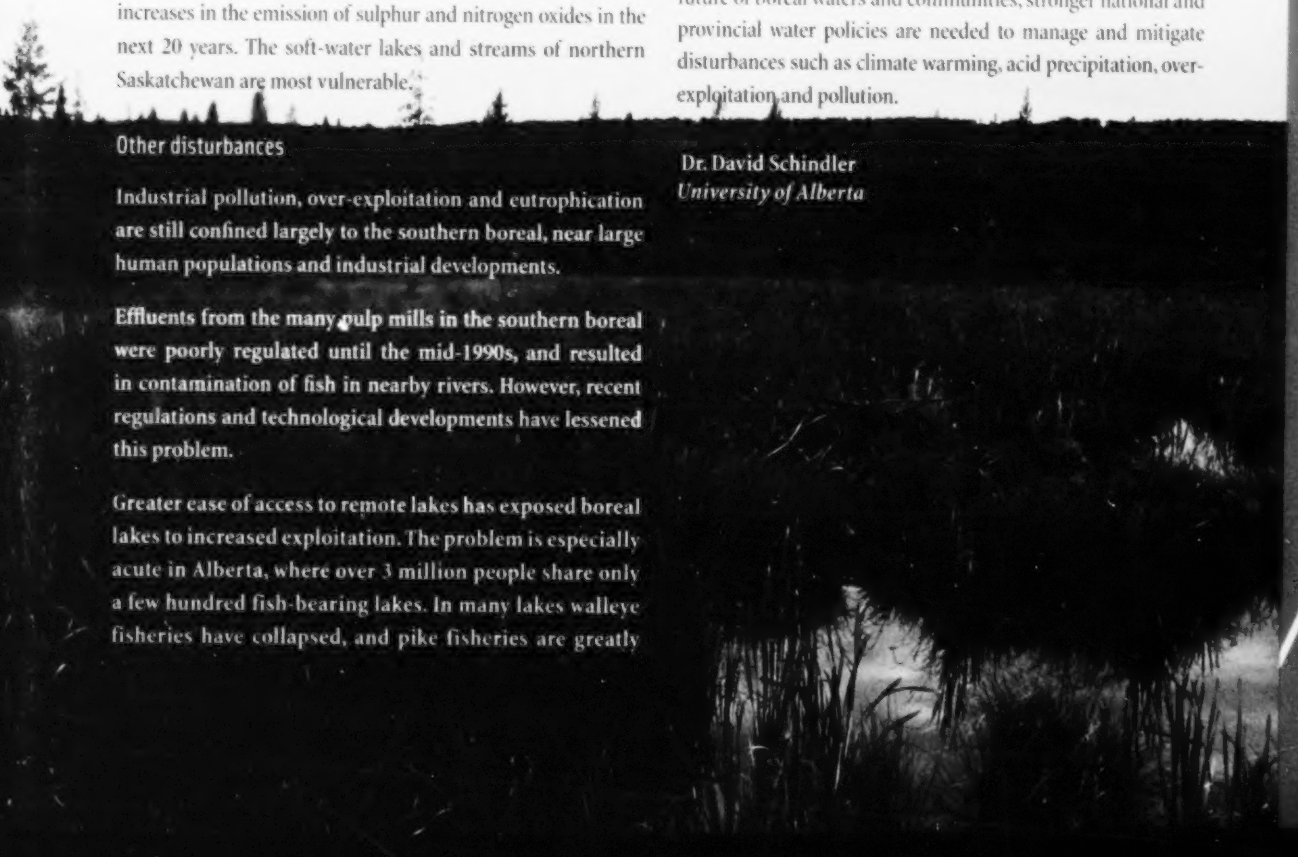
In western Canada, boreal lakes are threatened in several ways by climate warming. Many of the glacial relict species are near their thermal limits under normal conditions, and a few degrees of warming could cause them to decline or disappear, particularly in large, shallow, windswept lakes where no thermoclines (colder layers of water) develop to provide midsummer cold-water refuges. The watersheds of western lakes become much more susceptible to fire under warmer, drier conditions, and increased fire can cause increased run-off of nutrients and of mercury and other chemicals that are normally sequestered by terrestrial vegetation.

Temperature increases in the western boreal regions as predicted by global climate models could cause an increase in evapotranspiration (evaporation from the land and transpiration from the plants) beyond the level of precipitation, so that the western boreal could be warmer and drier in the future. This would cause river flows and lake levels to decline, and consequently retain more of the chemical substances that enter them. In dry southern parts of the western boreal, the warm climate and drought of the 1990s has already caused some lake outlets to cease flowing, resulting in increased salinity of the lakes.

Acid precipitation

Acid precipitation is a threat largely in eastern Canada, where prevailing winds carry sulphur and nitrogen oxides from industry and transportation in southeastern Canada and the northeastern United States over the soft-water lakes of the Canadian Shield, which have little resistance to acidification. Thousands of lakes and streams were acidified in the late twentieth century, resulting eventually in the regulation of sulphur oxide emissions. The regulations have allowed some lakes to recover. However, many lakes remain acidified, and soil fertility in some areas is threatened by the combination of forest harvesting and acid precipitation, both of which cause the loss of critical calcium from forest soils and fresh waters. In order to recover significant additional lakes, both sulphur oxides and nitrogen oxides must be reduced further. This will require reducing emissions from power plants, smelters and automobiles.

In western Canada, acid rain may become a regional problem downwind of the Alberta oil sands, where rapid development of bitumen extraction industries is expected to cause large increases in the emission of sulphur and nitrogen oxides in the next 20 years. The soft-water lakes and streams of northern Saskatchewan are most vulnerable.



Other disturbances

Industrial pollution, over-exploitation and eutrophication are still confined largely to the southern boreal, near large human populations and industrial developments.

Effluents from the many pulp mills in the southern boreal were poorly regulated until the mid-1990s, and resulted in contamination of fish in nearby rivers. However, recent regulations and technological developments have lessened this problem.

Greater ease of access to remote lakes has exposed boreal lakes to increased exploitation. The problem is especially acute in Alberta, where over 3 million people share only a few hundred fish-bearing lakes. In many lakes walleye fisheries have collapsed, and pike fisheries are greatly overfished. Lake trout have been totally eliminated from some lakes, including huge Lesser Slave. The proliferation of roads, seismic lines and trails, and the development of modern four-wheel-drive vehicles, all-terrain vehicles and snowmobiles, allow easy access for fishermen all year. Technological developments such as GPS, SONAR, underwater cameras, improved fishing lines, more powerful outboards and better lures also contribute to the increased exploitation.

Eutrophication (overfertilization) of lakes occurs when nutrients from the land flow into lakes, and the resulting abundance of plant life deprives animal life of oxygen. Eutrophication of boreal waters is occurring as a consequence of nearby land clearing, cottage development, changing land use and urbanization. Where cleared lands are turned into pastures or agricultural fields, manure and commercial fertilizers cause even greater run-off of nutrients. Typically, drainage of wetlands and destruction of riparian areas allow more of the mobilized nutrients to reach lakes and streams. Within a few hours' drive of major population centres like Toronto, Montréal, Winnipeg and Edmonton, extensive cottage developments on lakeshores can also cause eutrophication problems. Poorly installed and poorly maintained septic tanks, as well as lawn fertilizer, pet excrement and the destruction of natural shoreline vegetation, allow increased nutrient inputs to lakes.

Boreal lakes, rivers, streams and wetlands provide key ecological functions for wildlife in the boreal region. To protect the future of boreal waters and communities, stronger national and provincial water policies are needed to manage and mitigate disturbances such as climate warming, acid precipitation, over-exploitation and pollution.

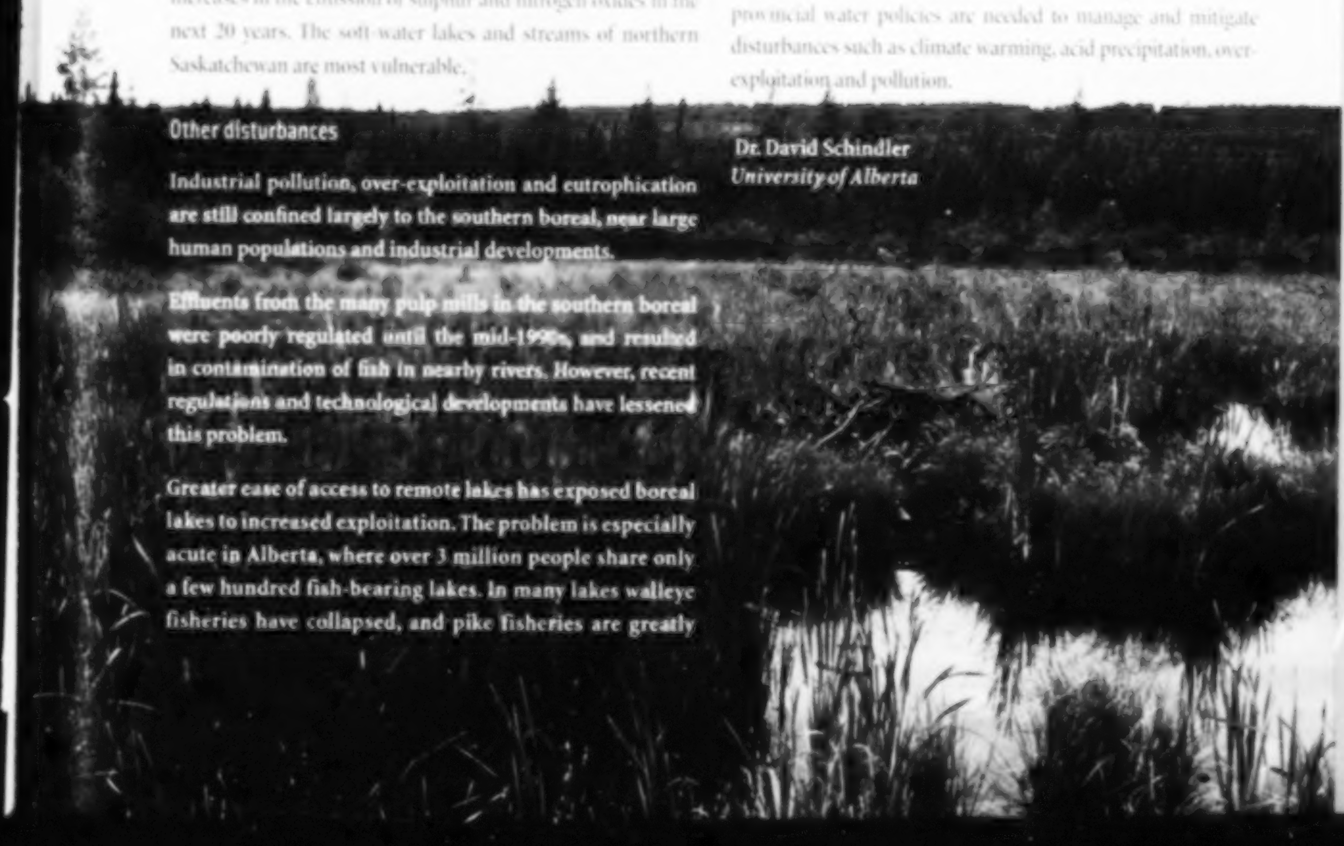
Dr. David Schindler
University of Alberta

would cause river flows and lake levels to decline, and consequently retain more of the chemical substances that enter them. In dry southern parts of the western boreal, the warm climate and drought of the 1990s has already caused some lake outlets to cease flowing, resulting in increased salinity of the lakes.

Acid precipitation

Acid precipitation is a threat largely in eastern Canada where prevailing winds carry sulphur and nitrogen oxides from industry and transportation in southeastern Canada and the northeastern United States over the soft-water lakes of the Canadian Shield, which have little resistance to acidification. Thousands of lakes and streams were acidified in the late twentieth century, resulting eventually in the regulation of sulphur oxide emissions. The regulations have allowed some lakes to recover. However, many lakes remain acidified, and soil fertility in some areas is threatened by the combination of forest harvesting and acid precipitation, both of which cause the loss of critical calcium from forest soils and fresh waters. In order to recover significant additional lakes, both sulphur oxides and nitrogen oxides must be reduced further. This will require reducing emissions from power plants, smelters and automobiles.

In western Canada, acid rain may become a regional problem downwind of the Alberta oil sands, where rapid development of bitumen extraction industries is expected to cause large increases in the emission of sulphur and nitrogen oxides in the next 20 years. The soft-water lakes and streams of northern Saskatchewan are most vulnerable.



Other disturbances

Industrial pollution, over-exploitation and eutrophication are still confined largely to the southern boreal, near large human populations and industrial developments.

Effluents from the many pulp mills in the southern boreal were poorly regulated until the mid-1990s, and resulted in contamination of fish in nearby rivers. However, recent regulations and technological developments have lessened this problem.

Greater ease of access to remote lakes has exposed boreal lakes to increased exploitation. The problem is especially acute in Alberta, where over 3 million people share only a few hundred fish-bearing lakes. In many lakes walleye fisheries have collapsed, and pike fisheries are greatly overfished. Lake trout have been totally eliminated from some lakes, including huge Lesser Slave. The proliferation of roads, seismic lines and trails, and the development of modern four-wheel drive vehicles, all-terrain vehicles and snowmobiles, allow easy access for fishermen all year. Technological developments such as GPS, SONAR, underwater cameras, improved fishing lines, more powerful outboards and better lures also contribute to the increased exploitation.

Eutrophication (overfertilization) of lakes occurs when nutrients from the land flow into lakes, and the resulting abundance of plant life deprives animal life of oxygen. Eutrophication of boreal waters is occurring as a consequence of nearby land clearing, cottage development, changing land use and urbanization. Where cleared lands are turned into pastures or agricultural fields, manure and commercial fertilizers cause even greater run-off of nutrients. Typically, drainage of wetlands and destruction of riparian areas allow more of the mobilized nutrients to reach lakes and streams. Within a few hours' drive of major population centres like Toronto, Montreal, Winnipeg and Edmonton, extensive cottage developments on lakeshores can also cause eutrophication problems. Poorly installed and poorly maintained septic tanks, as well as lawn fertilizer, pet excrement and the destruction of natural shoreline vegetation allow increased nutrient inputs to lakes.

Boreal lakes, rivers, streams and wetlands provide key ecological functions for wildlife in the boreal region. To protect the future of boreal waters and communities, stronger national and provincial water policies are needed to manage and mitigate disturbances such as climate warming, acid precipitation, overexploitation and pollution.

Dr. David Schindler
University of Alberta

BIRDS IN CANADA'S BOREAL FOREST: NEW PARADIGMS FOR PARADISE FOUND

At the dawn on a late May morning, the air in the boreal forest is cool and still. As the sun begins to filter through the trees, the voices of sparrows and flycatchers, warblers and thrushes begin to build to a glorious cacophony of song. This is the bounty of the boreal forest, home to as many as five billion landbirds. The mosaic of habitats that constitute the boreal forest stretches over half of Canada, creating one of the most diverse areas for forest birds in North America. With the largest area of wetlands of any ecosystem in the world, the boreal forest is also breeding ground for 12 to 14 million waterfowl and untold millions of shorebirds.

Most of these birds arrive each spring, taking advantage of the flush of insects available to feed their young. Coping with sometimes harsh weather and predation pressures, they raise one or two clutches of young before flocking up to return south to the United States and beyond. Other species—woodpeckers, chickadees and nuthatches—live in the boreal forest year-round. These resident species have unique physiological adaptations that allow them to withstand the extremes of winter. For instance, Black-capped Chickadees can survive an eight-degree Celsius drop in body temperature during cold winter nights by entering nocturnal hypothermia, a sort of temporary hibernation. In spring they breed earlier than their migratory counterparts, giving their young more time to develop before the onset of winter.

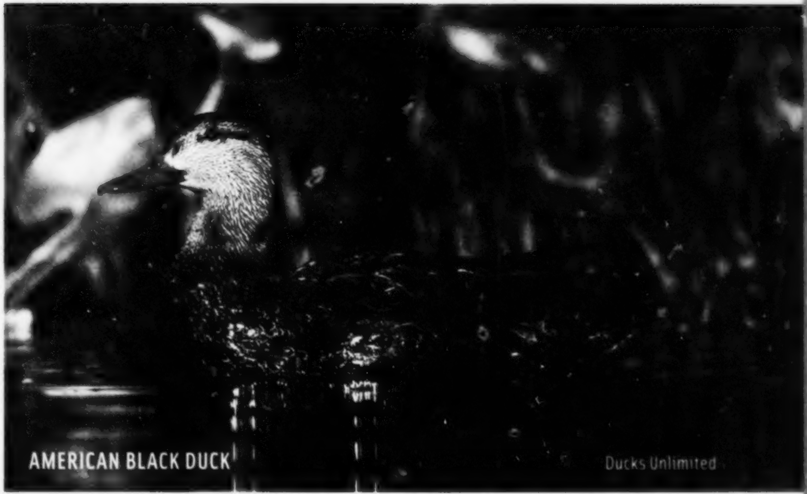
Canada's boreal is one of the last large intact forested ecosystems on earth. Given its vast size and relative remoteness, little scientific work has focused on boreal birds. From the limited information available on population status of boreal birds, it appears that at least 40 species are experiencing widespread population declines. These declines are distributed across species of landbirds, waterfowl such as Lesser Scaup and American Black Ducks, and shorebirds such as Solitary Sandpipers and Short-billed Dowitchers. One species associated with forested wetlands, the Rusty Blackbird, has declined by a spectacular 85 percent over the last 40 years. Identifying the causes of declines in species that breed in boreal forests but migrate south of the Canadian border is difficult. Human activity in boreal forests may be a contributing factor, and this is cause for concern among forest managers and conservationists.

While many Canadians may immediately think of forestry as the largest source of pressure on boreal forests, the sources actually vary across its geographic extent. In the western sedimentary basin, the area of timber cut annually by the oil and gas industry during exploration and extraction activities approaches that harvested by forest companies. Agricultural conversion eats away at the southern fringe of the boreal. In other areas, mining and hydro-electric power generation can create long-term sources of forest loss. The institutions established to manage these sectors were never designed to deal with the cumulative effect of all these activities, much less longer-term uncertainties such as the impacts of climate change. This burden adds to the challenge of environmentally constraining the efforts from which we expect continued economic growth.

BLACK-CAPPED CHICKADEE

© J. David Andrews

Boreal forests are generally resilient systems, continually regenerating from natural disturbances such as fire and insect outbreaks. Researchers currently have little sense of how much human activity the boreal forest can withstand over time. Some habitats for boreal birds are more vulnerable to human activity, particularly those that require time and natural processes to create. Old-growth mixedwood forests hold the most diverse communities of forest birds of all forest ages, but current forest management encourages younger stand ages. Newly burned forests have a unique complement of bird species owing to the abundance of standing burned timber and resulting beetle infestations, but these stands are also targeted for salvage harvesting operations. Wetland and bog complexes have a complement of species very different from the upland; such areas are important for myriad waterfowl, waterbirds and shorebirds. These are all habitats that must be thoughtfully managed; however, conservation of boreal forests will not be achieved through protection of local "hotspots." If the wealth of the boreal is in its spatial extent and the natural disturbances that maintain it, we cannot rely solely on areas of locked-up land to protect it. The boreal forest challenges us to think holistically about conservation planning, beyond the bounds of any one tenure, park or political jurisdiction.


AMERICAN BLACK DUCK
Ducks Unlimited

Within the working landscape, some forest managers are adopting harvesting practices that attempt to emulate natural disturbances such as wildfire. This affects the size and shape of areas harvested, as well as the pattern of trees and vegetation that are left to grow within those areas. Retaining live trees and patches of trees within cutblocks may provide some habitat value for forest birds immediately following harvest. Greater value is achieved as these tree patches age and provide "old-growth" characteristics in younger, regenerating stands. Riparian areas are another area of increasing research interest. Fires can burn to the edge of a waterbody; thus, in some jurisdictions, the desire to emulate natural disturbance has spurred the creation of new regulations for harvesting in riparian areas.

Success of the natural disturbance paradigm for harvesting will come from recognizing that not all aspects of wildfires can be emulated. Harvesting to emulate the action of wildfire suggests larger cutblocks and harvesting in riparian areas, but it also means retention of trees, both within a cutblock and as whole stands, where the interval between harvests is extended or the stand is removed from harvesting for a rotation. This paradigm is best applied using active adaptive management—management strategies that test new practices and maintain flexibility to apply new insights as they are acquired.

As we move towards conservation planning for boreal forests and the birds that live there, certain core information needs must be addressed. Environment Canada's Western Boreal Conservation Initiative (WBCI) was launched to engage with stakeholders and others interested in conservation of boreal biodiversity. (For more information, visit http://www.pnr-rpn.ec.gc.ca/boreal.) WBCI is supporting the development of a national boreal bird monitoring program that will work in partnership to provide information on species distributions, status, population trends, and habitat associations over a landscape that has historically been difficult to access.

In the shorter term, modelling techniques can estimate where birds are located and which habitats they rely on. A national-scale project is being developed in partnership between WBCI and Boreal Ecosystems Assessment of Conservation Networks (BEACONs), the science platform for the Boreal Conservation Framework developed by the Canadian Boreal Initiative and its partners. Key to this project's success is cooperation and collaboration with avian ecologists working in boreal forests across Canada. With further work, this project will also test management scenarios and their implications for boreal bird populations. In addition, it will inform a conservation framework that BEACONs is developing for Canada's boreal forest.

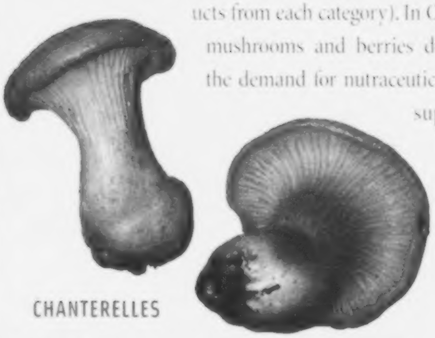
The challenges facing the boreal forest and its avian populations are widespread and pressing, but the opportunity to effect change is unprecedented. And the bird songs in the dawn forest should serve to remind us why our efforts will be worthwhile.

Samantha J. Song, Ph.D. and Kevin C. Hannah, M.Sc.
Western Boreal Conservation Initiative
Canadian Wildlife Service, Environment Canada

NON-TIMBER FOREST PRODUCTS AND SUSTAINABLE DEVELOPMENT IN THE BOREAL FOREST

Non-timber forest products (NTFPs) are botanical products, excluding wood, that grow in forests and that can be used as food, medicine or ornaments or for industrial purposes. Examples of these products include maple sap, mushrooms, herbs, pine cones, resins and natural dyes. Some definitions include services that forests provide (such as recreation and tourism); still other definitions consider the scale of the operation and whether the product originates from natural forests, plantations or agroforestry operations.

Today, nearly 500 types of NTFPs are commercially traded in Canada. These products differ widely in their characteristics and in where they come from, how they are produced and how they are used. Generally, NTFPs fall into four categories: food, natural materials and manufacturing, health and personal care, and decorative and aesthetic (see table on page 76 for examples of products from each category). In Canada maple syrup, mushrooms and berries dominate—although the demand for nutraceuticals (natural dietary supplements), ornaments (such as pine cones) and other products from boreal forests is growing.



CHANTERELLES

According to researchers at the Canadian Forest Service (CFS), traditional NTFP industries have the potential to contribute $1 billion to the Canadian economy (see table on page 75 for current economic value of selected products), although the exact value of Canada's NTFPs is not known. There is also huge potential for growth in value-added industries. Edible mushrooms provide another example—exporting this product could, in the future, contribute as much as $115 million to the Canadian economy.

CONSERVATION AND SUSTAINABLE USE

Until the 1992 Rio Conference on Environment and Development focused attention on the need for forest products other than wood and for ecosystem-based management and sustainable development, management of boreal forests was concerned almost exclusively with wood values. Ongoing efforts to link conservation of

MOREL

Wild Mushrooms: A Developing Resource from Boreal Forests

The moist floor of a boreal forest is an ideal habitat for mushrooms. Pine mushrooms, chanterelles and morels are most often collected in boreal forests. These mushroom species have the best-established commercial markets, ranging from local restaurants to commercial operations, where harvesters pick the mushrooms for grading and shipping to markets across Canada and internationally, notably in Europe and Asia. In Japan, the pine mushroom is a delicacy, known for its aromatic odour, particular texture and taste, and can command a price of about $400 per kilogram.

Many of the important commercially hunted forest mushrooms form a symbiotic association with the roots of some tree species to form a new structure, called mycorrhiza (fungus-root). It may be possible to enhance the growth of mycorrhizae through the inoculation of seedlings (or other forest management practices), and in this way combine wood fibre and non-timber production.

PINE

Estimated Current Output of Selected Non-Timber Forest Products in the Canadian Economy*

NTFP	Output in tonnes or litres (thousands)	Current economic value (thousand $)
Honey	37 072	160 805
Tree saps	34 761	163 968
Berries	149 373	278 654
Mushrooms	1.14	43 000
Understorey plants	2.30	75 321
Wild rice	1 013	3 492
Total		**725 240**

* Calculations based on extrapolated data from S. Wetzel et al., *Bioproducts from Canada's Forest: New Partnerships in the Bioeconomy*. In preparation.

biodiversity and economic development have also helped stimulate interest in NTFPs both in Canada and internationally.

There is much we do not understand about the shrubs, herbs and fungi that are being considered for development as NTFPs. This lack of knowledge makes it difficult to assess the sustainability of harvest and to develop management plans. Any harvesting has some effect on an ecosystem, but the extent of the impact depends on many factors. These factors include the amount of material harvested, the intensity and frequency of harvesting, the plant part used (effects are more severe when roots, fruits or reproductive structures are harvested), and how well the habitat and the plant recover following harvesting (some habitats are more fragile than others). Experience with NTFP harvesting in tropical forests has shown the importance of careful management, regeneration and a sustainable level of harvest. Climate change and other effects from pollution and anthropogenic activities can also increase the impacts of harvesting.

Monitoring the harvested species and their interactions with other species is important in determining the harvesting impact. Monitoring also ensures that commercial harvesting does not lead to declines in availability of wild stocks. For example, field studies to determine the potential yields from wild ginseng found that ginseng populations of less than 170 plants could not be harvested sustainably at all, and populations larger than 170 plants have a sustainable yield of only 30 to 90 plants. Since most patches of wild ginseng are smaller than 170 plants, the research showed that harvesting wild ginseng is not ecologically or economically viable.

MARKETS AND ECONOMIC POTENTIAL

Widespread economic interest in NTFPs of boreal forests in Canada is relatively new, but the National Forest Strategy is committed to stimulating the development of these products and services. CFS researchers have reported that, over the last couple of decades, exports of non-timber and value-added products have increased more than exports of conventional wood and paper products.

Economic analysis plays a major role in determining whether a new NTFP has the potential to be harvested profitably in an environmentally sustainable setting. The evaluation must address issues surrounding harvesting methods and time frames, prices, markets, their locations and access to them. To add to the challenge of the analysis, many non-timber products have no defined market value, and the prices assigned to the products may not reflect true economic values.

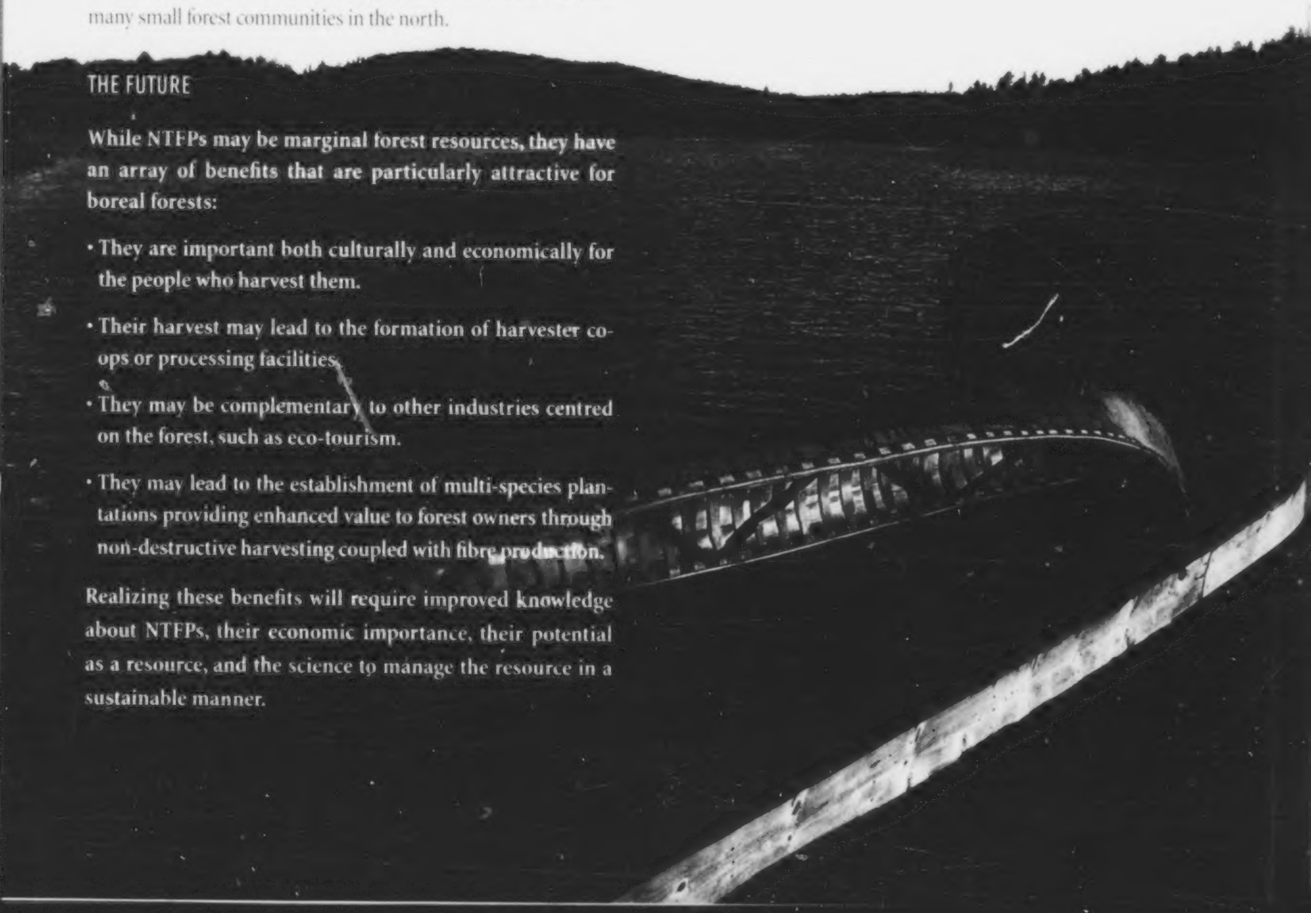
SOCIAL AND CULTURAL ASPECTS

Non-timber forest products offer social benefits and sometimes represent culturally significant activities for local communities. For many Aboriginal and rural communities, the harvest of

medicines, berries, bark and other forest goods is an integral part of life. Traditional ecological knowledge and management approaches—such as the use of fire and traditional harvesting techniques—are a part of their culture.

Examples of Food Products	**Examples of Natural Materials and Manufacturing Products**	**Examples of Health and Personal Care Products**	**Examples of Decorative and Aesthetic Products**
Berries	Adhesives	Aromatherapy oils	Christmas trees
Beverages	Alcohol	Cosmetics	Cone crafts
Essential oils	Candles	Drugs	Bark crafts
Flavouring agents	Cloth	Essential oils	Wood crafts
Herbs and spices	Essential oils	Herbal health products	Carvings
Honey	Fragrances	Nutraceuticals	Floral arrangements
Maple/birch saps–syrups, sugars, taffy, jelly, butters	Incense	Perfumes and fragrances	Wreaths, garlands, swags
Mushrooms	Resins	Pet care products	Natural dyes
Nuts	Specialty wood products	Shampoos	
Seeds	Stuffing material	Soaps	
Teas	Thread and rope		
Vegetables	Turpentine		

The Northern Forest Diversification Centre (NFDC) in Northern Manitoba has identified the development of an NTFP industry as a realistic, practical, income-generating opportunity that expresses local values, is based on local resources, and benefits local people. This opportunity is especially attractive for marginalized forest communities with the requisite local skills and knowledge. The NFDC model is working with the Centre for Non-Timber Resources at Royal Roads University in British Columbia to develop a Western Canadian NTFP Network from Manitoba to the Yukon. Future plans include expanding this community development model across the Canadian boreal forest, as a small but positive step in fighting poverty and developing a sustainable economy for many small forest communities in the north.



THE FUTURE

While NTFPs may be marginal forest resources, they have an array of benefits that are particularly attractive for boreal forests:

- **They are important both culturally and economically for the people who harvest them.**
- **Their harvest may lead to the formation of harvester co-ops or processing facilities.**
- **They may be complementary to other industries centred on the forest, such as eco-tourism.**
- **They may lead to the establishment of multi-species plantations providing enhanced value to forest owners through non-destructive harvesting coupled with fibre production.**

Realizing these benefits will require improved knowledge about NTFPs, their economic importance, their potential as a resource, and the science to manage the resource in a sustainable manner.

FOREST-ASSOCIATED SPECIES AT RISK: WHAT IS THE STATUS?

Approximately two thirds of Canada's estimated 140 000 species of plants, animals and micro-organisms are found in the forest. Each forest-associated species plays a unique role in forest ecosystems, but over 400 of them are currently at risk. In response to this threat, Canada's National Forest Strategy has identified the conservation of forest biological diversity as a priority. The revised Canadian Council of Forest Ministers' framework of Criteria and Indicators of Sustainable Forest Management (2003) provides eight indicators to assess the state of biodiversity within Canada's forests. One of the core indicators in this framework is the status of forest-associated species at risk.

A forest-associated species is one that is measurably dependent on a forest ecosystem for any aspect of its life history (included are indirectly dependent species which consume forest-based or derived resources). The status of forest-associated species is often used to monitor ecosystem and genetic diversity, forest structures and patterns, and key ecological processes. The status of these species serves as a barometer, since a decrease in a species population can signal an imbalance in a biological system that may damage the long-term health of our forests and lead to productivity losses.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC), an independent scientific committee, evaluates species suspected of being at risk. COSEWIC assigns national status designations to these species based on the best scientific information available. The COSEWIC national list of species at risk is divided into five categories, from "extinct" to "special concern." The current list includes 467 species (as of November 2004) and can be viewed at http://www.cosewic.gc.ca.

When a species is put on the COSEWIC List of Wildlife Species at Risk, the federal Cabinet consults with stakeholders and other groups before deciding whether it should be legally protected under the national *Species at Risk Act* (SARA). Currently, 306 species are on this Legal List in Schedule 1 of the act. Recovery strategies are prepared within a year after listing for the threatened species, and within two years for endangered and extinct species.

COSEWIC Status Categories

Category	Definition
Extinct	A species that no longer exists
Extirpated	A species no longer existing in the wild in Canada, but occurring elsewhere
Endangered	A species facing imminent extirpation or extinction
Threatened	A species likely to become endangered if limiting factors are not reversed
Special concern	A species that may become threatened or an endangered species because of a combination of biological characteristics and identified threats

Of the 467 COSEWIC-designated species, 305 (65 percent) are considered to be forest-associated, and 219 of these are protected under SARA's Legal List (as of January 2005). Of the forest-associated species reassessed by COSEWIC since 1999:

- 60 percent have the same COSEWIC status
- 17 percent have been moved to a higher risk category
- 1 percent moved to a lower risk category
- 22 percent are new species assessed by COSEWIC for the first time

COSEWIC does not currently document why species are transferred between categories, and therefore the data showing changes from one status category to another must be interpreted very carefully. Changes in status could be the result of new information rather than an actual improvement or deterioration in the status of the species.

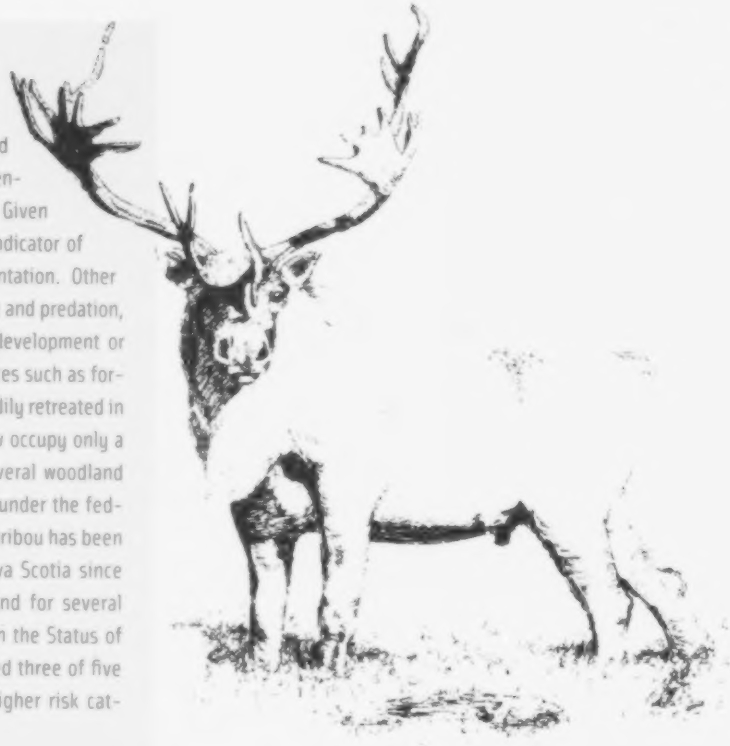
The map on page 79 shows the number of forest-associated species at risk protected under SARA in each of Canada's ecozones. The largest concentrations of these species are in the coastal forests of British Columbia (Pacific Maritime ecozone) and in the Carolinian forest of southern Ontario (Mixedwood Plains ecozone).

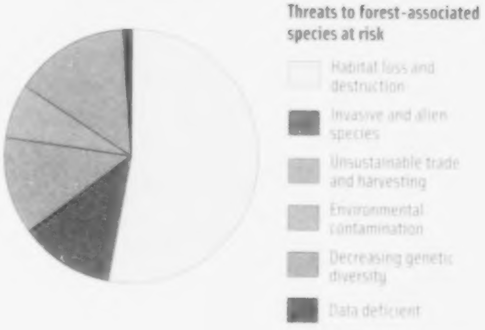
The map also shows that Canada's vast boreal forests (Boreal Cordillera, Boreal Plains and Boreal Shield ecozones) have relatively few species at risk. However, these evergreen forests provide habitats for some of Canada's best-known species, such as the grizzly bear, whooping crane and woodland caribou (see text box). Maintaining and recovering these boreal species is a prime objective of sustainable forest management.

Woodland Caribou

The woodland caribou relies on relatively large and healthy areas of mature and old-forest habitat, making this species sensitive to fragmentation and habitat loss. Given such characteristics, this species is an indicator of forest connectivity and habitat fragmentation. Other pressures include illegal hunting, disease and predation, human disturbances such as industrial development or land use changes, and natural disturbances such as forest fires. The woodland caribou have steadily retreated in the face of human development, and now occupy only a small portion of their former range. Several woodland caribou populations are currently listed under the federal *Species at Risk Act*. The woodland caribou has been extirpated from New Brunswick and Nova Scotia since the 1920s and from Prince Edward Island for several centuries. Since 1999, the Committee on the Status of Endangered Wildlife in Canada has placed three of five populations of woodland caribou in a higher risk category following reassessments.

Provincial, national and international efforts to protect significant populations of the woodland caribou have been ongoing for over a decade. Many provinces have developed or are in the process of developing recovery and conservation strategies for this species. Conserving some of the most susceptible populations has proven to be challenging because they face numerous threats. Finding the right balance between environmental and socio-economic factors is key to the survival of woodland caribou.





Threats to forest-associated species at risk

Habitat loss and destruction
Invasive and alien species
Unsustainable trade and harvesting
Environmental contamination
Decreasing genetic diversity
Data deficient

Source: COSEWIC Status Reports

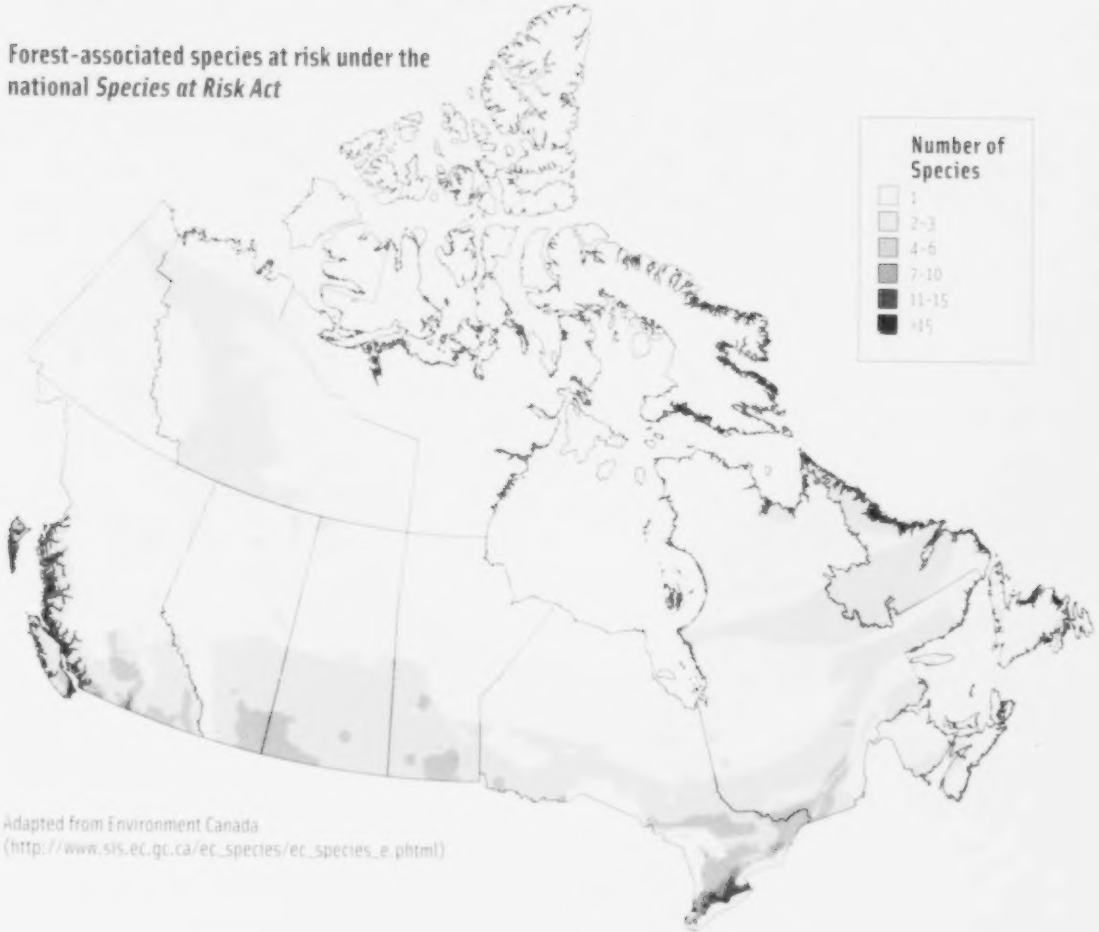
Management strategies need to be integrated and adaptive, ranging from strict protection (such as ecological reserves) to sustainable forest management (such as harvesting in a way that leaves individual trees or groups of trees for wildlife). To be successful, these strategies require support for monitoring, information managing and reporting.

There are many threats to species at risk, and sometimes particular species or populations decline because of a combination of these threats (see figure above). According to the COSEWIC status reports, the main threat to forest-associated species at risk is habitat loss or destruction. The protection of "critical habitat" under SARA brings a legislative tool to mitigate this threat. The act aims to protect places where a species at risk lives, feeds, breeds and raises its offspring. SARA's intent is to legally protect critical habitats as much as possible by supporting voluntary actions, stewardship measures and management practices that minimize habitat destruction.

Another major threat to biodiversity is decreasing genetic diversity, often called the invisible extinction. Genetic diversity allows species to adapt to changing environmental conditions, such as climate change, or to compete with an introduced invasive alien species. Despite increased detection efforts at Canada's ports of entry, these species are entering more frequently and their number is growing. The increased global movement of people and commodities is breaking down the major bio-geographical barriers that have, in the past, kept the flora and fauna from different continents distinct. Many aggressive species are now widely distributed around the world, and in some areas they exist in very high densities.

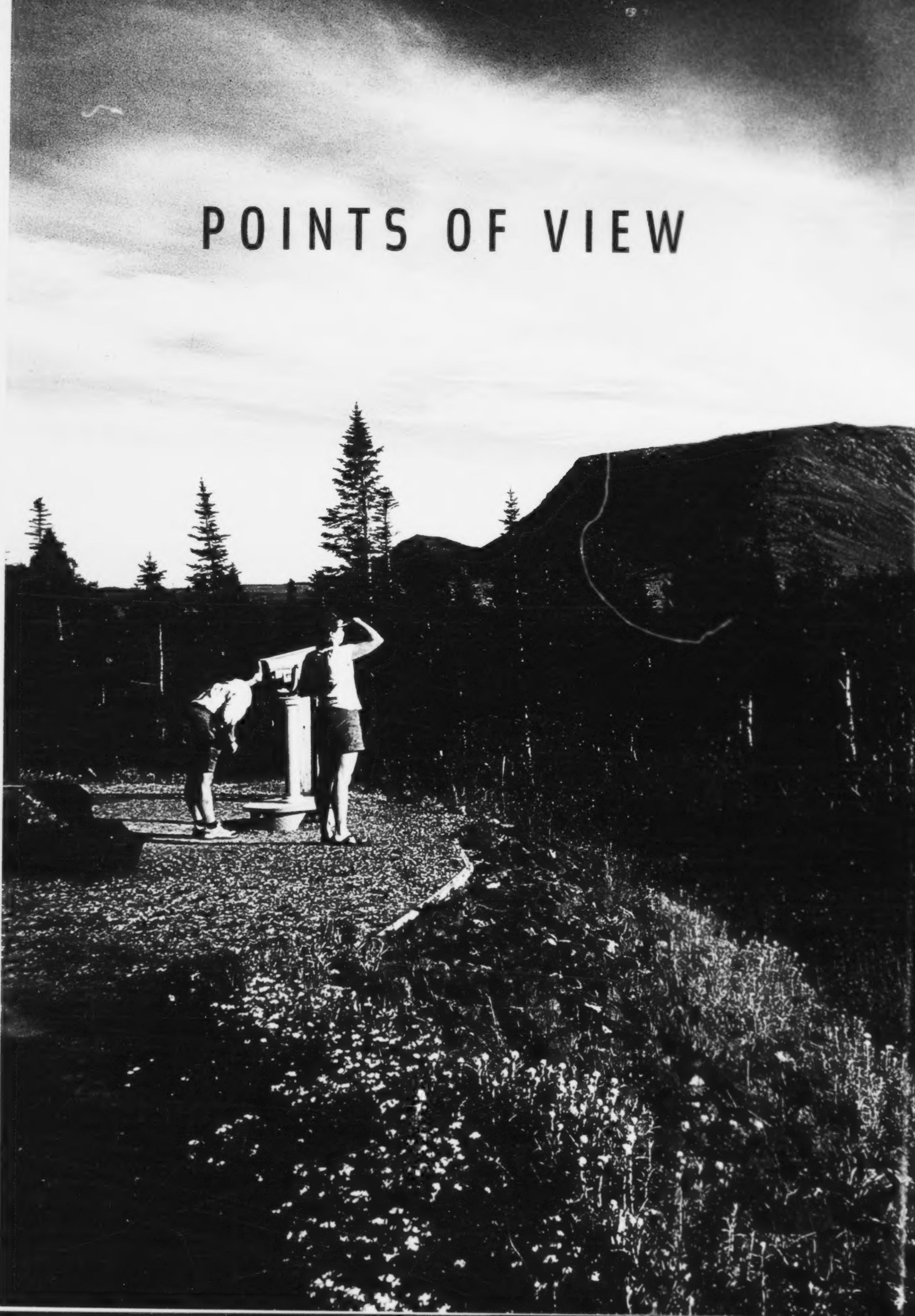
Canada, as a signatory country to the Convention on Biological Diversity, is committed to working towards significantly reducing, by 2010, the current rate of biodiversity loss at the global, regional and national levels. This initiative will help to alleviate poverty and benefit all life on earth. Tracking species at risk is only one aspect of monitoring biodiversity to determine whether we are approaching this target.

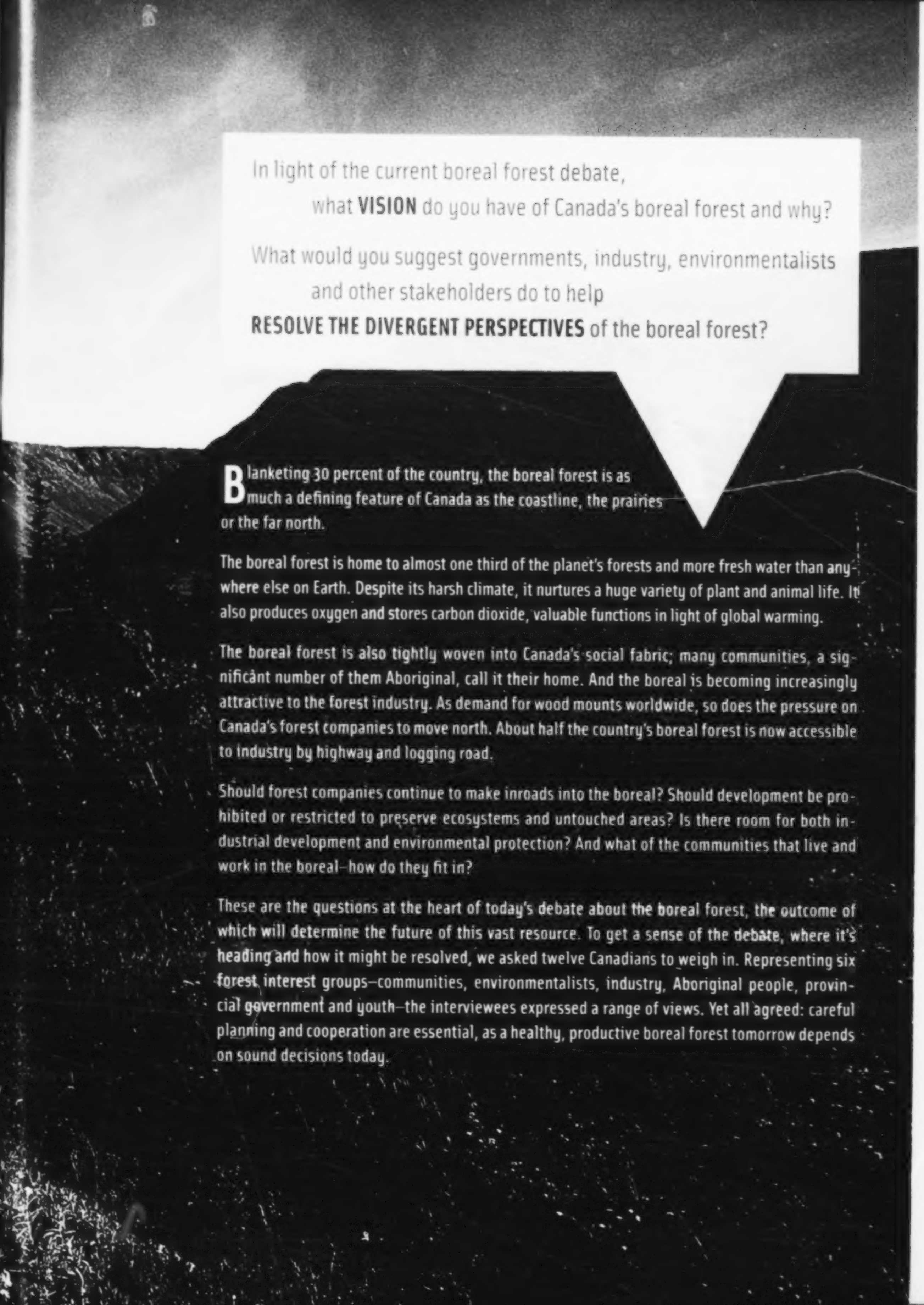
Forest-associated species at risk under the national *Species at Risk Act*



Adapted from Environment Canada
(http://www.sis.ec.gc.ca/ec_species/ec_species_e.phtml)

POINTS OF VIEW





In light of the current boreal forest debate,
what **VISION** do you have of Canada's boreal forest and why?

What would you suggest governments, industry, environmentalists
and other stakeholders do to help
RESOLVE THE DIVERGENT PERSPECTIVES of the boreal forest?

Blanketing 30 percent of the country, the boreal forest is as much a defining feature of Canada as the coastline, the prairies or the far north.

The boreal forest is home to almost one third of the planet's forests and more fresh water than anywhere else on Earth. Despite its harsh climate, it nurtures a huge variety of plant and animal life. It also produces oxygen and stores carbon dioxide, valuable functions in light of global warming.

The boreal forest is also tightly woven into Canada's social fabric; many communities, a significant number of them Aboriginal, call it their home. And the boreal is becoming increasingly attractive to the forest industry. As demand for wood mounts worldwide, so does the pressure on Canada's forest companies to move north. About half the country's boreal forest is now accessible to industry by highway and logging road.

Should forest companies continue to make inroads into the boreal? Should development be prohibited or restricted to preserve ecosystems and untouched areas? Is there room for both industrial development and environmental protection? And what of the communities that live and work in the boreal–how do they fit in?

These are the questions at the heart of today's debate about the boreal forest, the outcome of which will determine the future of this vast resource. To get a sense of the debate, where it's heading and how it might be resolved, we asked twelve Canadians to weigh in. Representing six forest interest groups–communities, environmentalists, industry, Aboriginal people, provincial government and youth–the interviewees expressed a range of views. Yet all agreed: careful planning and cooperation are essential, as a healthy, productive boreal forest tomorrow depends on sound decisions today.

HOW THEY STACK UP

They come from different groups and have different perspectives on the boreal forest. So it's not surprising that this year's interviewees voiced some contradictory opinions. What is surprising is the number of beliefs about the boreal forest that they share. These individuals see things differently, but their common ground bodes well for the future of Canada's boreal forest.

Where they agree

Balanced management

The boreal forest is valuable in many ways, to many groups. It must be managed so that all its benefits–ecological, economic, social, historical–continue to be enjoyed equally.

Cooperation in the forest

Everyone with a stake in the boreal forest must work together to manage it responsibly for future generations, so that no one group or interest predominates.

Aboriginal involvement

Canada's Aboriginal people, many of whom are boreal dwellers, need a direct say in forest decisions, and their rights, traditions and livelihood must be recognized and respected.

Land use planning

Strategic planning, involving all affected parties, is the only way to get balance, cooperation and community input.

Where they disagree

Who should take the lead?

Some believe that regions and communities should have the largest influence in planning for the boreal forest. Others think the provinces should be at the helm. As for national guidance, some feel it's valuable; others think it's unrealistic.

What is the role of protected areas?

Views differ here: protected forests should serve as working laboratories; they (or portions of them) should remain untouched and open to natural disturbances; they should not be left alone because they can become unhealthy, prone to infestation and fire.

What about environmental concerns?

Interviewees concur that environmental issues are key in managing the boreal forest. But some suggest that environmental groups wield too much influence, and that their role should become less rhetorical and more practical.

Is consensus a valid goal?

Some feel that consensus among boreal stakeholders is the only option. Others think debates and disagreements are inevitable, even desirable.

COMMUNITIES

Lawrence Martin is the Mayor of Cochrane, Ontario.

Ross Risvold, former Mayor of Hinton, Alberta, is Director of Special Projects for the West Yellowhead Community Futures Development Corporation.

Lawrence Martin and Ross Risvold are both municipal leaders from small boreal towns in which primary industry, including the forest industry, fuels a large chunk of the economy. Both believe Canada must do things differently if it is to manage its share of the boreal forest responsibly. But their ideas on what should change are quite at odds.

"My vision is full of fear," says Martin. "There's a lot of juggling of needs. There are a lot of beavers out there and not enough trees to go around. With our population growing, I see the point where there will be no forest resource left for people. [In Cochrane] we're near the treeline and we can see the end of the trees from where we sit. They're getting smaller and scarcer... There's talk about protection, but not much action."

Martin adds that Canada should protect the boreal forest by making conservation the focal point of land use planning. Planning must be stringent; it must limit what and how much industry can harvest and must encourage management of the forest for all its benefits, not just its commercial value.

Risvold agrees that balanced forest management is a must, that no single forest user or interest group should become the centrepiece of decision making. However, he believes that one sector—the environmental sector—is currently exerting a large and expanding influence in the boreal forest. "Many environmental groups are very rich in resources, and have sophisticated practices in communications and government relations. They also have increasing support from larger organizations in the United States. As a result, American influence on Canadian policy and legislation is growing and powerful."

Risvold's biggest concern is that environmental issues will become more and more influential, without equal emphasis on the other two pillars—social and economic—that he sees supporting Canada's model for sustainable forest development. At present, he says, social and economic areas receive less funding and less attention than the environmental sector. If this continues, Canadian communities may see negative effects like those faced by their U.S. counterparts. "Another lumber mill in Montana just shut down because they were cut off access to local timber," Risvold notes. "Such shutdowns have huge negative consequences for forest communities that depend heavily on forest resources." By balancing the three pillars, he says, Canada has an opportunity to create a model of boreal sustainability that can be followed the world over.

Risvold also worries that forest protection doesn't always mean forest health. "Protection can, for instance, lead to fuel buildup, which can cause devastating forest fires and subsequent effects on several things, such as greenhouse gas emissions, erosion, human life and loss of property, and loss of habitat which supports species such as woodland caribou."

Both municipal leaders see research and development as critical for the boreal forest, but here again they part ways. Martin, concerned that forest resources are dwindling and may not be available for future generations, believes R and D should focus on developing alternatives to wood fibre in certain products. Risvold, on the other hand, feels that research should concentrate on enhancing the forest resource. For one thing, forest researchers should develop decision support systems in the areas of social and economic sustainability, he says. For another, initiatives like the Model Forest Program, which are community-based and community-driven, should expand.

For both Martin and Risvold, boreal planning must involve stakeholders at all levels. Both say governments, provincial and federal, have a role to play in resolving different perspectives and bringing balance to planning. But they disagree about the influence forest communities should wield. For Risvold, local input is critical. "Forest communities, not people in removed urban regions, need increased influence into the policy, legislation and programs that directly affect them." Martin, while acknowledging the value of local input, cautions that communities will always feel pressured to keep jobs. For him, tighter provincial regulations are the only way to address the depletion he is witnessing in northern Ontario.

Cochrane and Hinton are very different locales. Cochrane, in northeastern Ontario, sits in a region where the forest industry is active. Hinton, on the other hand, borders Jasper National Park, an area prized for its natural beauty. The values and activities in each region no doubt account, at least in part, for the contrasting views of these two community leaders.

ENVIRONMENTALISTS

Tim Gray is Director of Boreal Forest Programs with the Canadian Parks and Wilderness Society (CPAWS) in Toronto.

Gary Stewart, based in Edmonton, is Manager of Boreal Conservation Programs for Ducks Unlimited Canada.

Tim Gray thinks Canada has a chance to set precedent in managing the boreal forest. But Gray envisions a different balance between development and conservation than the existing one.

Canada still relies on an outdated model of forest management, says Gray, one that considers development first and conservation as an afterthought. His vision for the boreal would change all that. "We can build on our experience with the southern boreal forest, where human development predominates and there are nodes of nature and corridors for wildlife. What I'd like to see in the northern boreal is the opposite: the forest staying predominantly wild, with nodes of human development and corridors for human transportation." To that end, he says, in looking north of the existing industrial line, we must make conservation decisions first, then decide where and when development can take place.

Similarly, Gary Stewart thinks Canada should embrace a "one hundred percent conservation solution" in the boreal forest. But conservation, in his mind, means a mixture of forest protection and leading-edge sustainable development. "I am a firm believer that [the two] can go hand in hand, ensuring that the economic, ecological and social values of the boreal forest are maximized for all."

Like Gray, Stewart underscores the importance of moving conservation planning up the agenda. "We've seen in the south what can happen when you have to restore wetlands and watersheds after decades of unrestrained development. Restoration...is a very expensive and difficult proposition. In the boreal we have been presented with an incredible opportunity to do it differently, to do the conservation planning in concert with or before development occurs."

In the working forest, he says, certain companies are already leading the way. Their involvement in forest certification, their investments in science and their commitment to ongoing improvement are setting an example for other industries to follow in developing best practices for sustainable development.

Ducks Unlimited and CPAWS are both members of Canada's Boreal Leadership Council, a group founded in December 2003 to work towards a national vision for managing the boreal forest. Besides environmental organizations, the Council involves representatives from Aboriginal groups and the forest industry. A core concept for the Council is that forest plans be agreed to by all involved in and affected by the boreal. So it's not surprising that Gray and Stewart stress collaboration as the key to dealing with divergent perspectives on the boreal forest.

For Stewart, information sharing is critical, as is cooperation in areas like research and funding. "With something as huge as the boreal forest, no one jurisdiction or agency can look at everything. The approach has to be collaborative, and it has to be informed by a mixture of science, traditional knowledge and economic values."

For Gray, forest certification offers promise for resolving different viewpoints. "Certification is one of the most effective forums for bringing together communities, environmental groups, businesses, Aboriginal people and others. It's more effective than many government-led attempts I've participated in." Certification, he adds, is one of the best options for making forest practices more sustainable. "The provincial governments have the means to influence market access through regulation and policy. But the major driver has to be the marketplace."

INDUSTRY

Ken Higginbotham is Vice-President of Forestry, Environment and External Relations with Canfor (Canadian Forest Products Ltd.) in Vancouver.

Jim Lopez works for Tembec Inc. in Témiscaming, Quebec. He is the Executive Vice-President and President of the Forest Products Group.

Tembec sits on the Boreal Leadership Council with CPAWS and Ducks Unlimited, which may explain why Jim Lopez shares some of his environmentalist counterparts' vision. Above all, he says, balance is important in the boreal forest. "To get that balance, it's important that protected forest areas be identified first, before industry makes any investments."

Lopez offers two current examples of the kind of planning process he envisions for tomorrow's boreal. One example involves millions of hectares of sparsely inhabited boreal forest on the east side of Lake Winnipeg, of interest to forest companies and hydro-electricity developers. The Province of Manitoba has begun a planning exercise (which Tembec is involved in) to make sure that development, if it proceeds, is sound, balanced and mindful of different forest needs. The second example is in northern Ontario, where Tembec is discussing future development of the forest with Aboriginal groups that may want to get involved.

There are pros and cons to these inclusive planning processes, says Lopez. "On the positive side, this kind of planning will lead to balance. On the negative side, because of the different jurisdictions involved, the process is very bureaucratic and takes a long time. There's a lot of information to gather, and a lot of competing needs." As well, with local and Aboriginal communities getting more deeply involved in planning, information sharing will be more important than ever. "Land use planning is very technical; the concepts are difficult for everyone but the experts to understand. We need to educate key people in the communities so that they can explain the planning process to residents and develop processes to get valid feedback from residents on their needs and priorities."

The ideal of a boreal forest that balances industrial, social and ecological needs is shared by Ken Higginbotham. But he suggests we open up our view of what constitutes forest protection in that balance. "There are reasons to protect some forest," he says. "But we can also carry out forest activities to mirror successional disturbances in the boreal." As well, he advocates setting aside areas for studying boreal ecosystems. "We should use protected boreal regions less as locked-away areas and more as working laboratories." Canfor is part of just such a project in northern Alberta. Ecosystem Management by Emulating Natural Disturbances (EMEND), a large-scale study of how forest management can emulate natural disturbances, has forest companies and researchers working on 60 different projects in the forest.

As for the working parts of the boreal, Higginbotham is confident that forest companies have the ability—technical, scientific and

operational—to manage the land sustainably. Lopez, on the other hand, feels better practices and standards are in order. "We need to manage the boreal forest better," he says. "We need more natural cutblocks, and we need to minimize disturbances to the environment." Both men see forest certification as pushing industry closer to the goal of a sustainable boreal forest.

How do we address the different perspectives of boreal stakeholders? Higginbotham and Lopez both point to the need for cooperation and compromise.

More integrated land use is the key for Higginbotham. Users of the boreal, whether in forestry, mining, oil and gas or tourism, must cooperate more closely to reduce the number of roads and areas opened up for development—to minimize the overall footprint on the land. The provinces have a duty to fulfill here, he believes. "When awarding permits and licences to different land users, government should put forward the clear expectation that these different users work together."

Lopez agrees that political will in the provinces is essential for the successful integration of forest needs. Overall, he sees progress on boreal issues as coming more from provincial and local initiatives than from national ones. "There can't be one template for every circumstance, community or region," he comments. "You can't have templates in other areas of business, and you can't [have them] to manage different forest areas either."

ABORIGINAL PEOPLE

Eric Morris is Grand Chief of the Council of Yukon First Nations.

Jim Webb is the Manager of Intergovernmental and Corporate Affairs with the Little Red River Cree Nation in Alberta.

Some 600 First Nation communities live in the boreal forest, says Jim Webb. His vision of the boreal is based on those communities being able to continue their traditions and their livelihood. "First Nations have been involved in industrial activities in the forest since the fur trade. Now the principal boreal activities involve timber, minerals, and oil and gas. Currently First Nations have very little recognized ownership and control over these resources. That will have to change. A sustainable future within the boreal must be based on equitable reinstatement of First Nation resource interests."

Eric Morris agrees that recognizing Aboriginal values and territorial uses is the only way Canada can take a truly balanced approach to sustainable boreal management. "We've lived here longer than anyone else," he says. "When governments and industry decide to harvest the forest, they look at what's there and decide what they can take. When we look at harvesting, we consider how the activity will impact everything—the land, the plants, the animals."

Webb echoes this thought: "Aboriginal people look at the forest at the landscape level. We need to consider everything—forest activities, agriculture, oil and gas, and other resource use—because it all affects the landscape." He finds that governments and industry still approach forest management project by project, rather than taking the holistic approach needed for sound forest decisions.

Trends that threaten to alter the boreal forest, especially in the Yukon, concern Morris. Climate change and forest fire are two phenomena he already sees affecting his territory. It's vital to be proactive in confronting these trends, he feels, and take actions that are best for the land. Till now forest development in the Yukon has been limited, so the territory hasn't yet experienced the environmental problems of provinces such as British Columbia, he says. "But we need to be prepared. We need to learn from other jurisdictions, from their mistakes and their lessons, so that when there's more interest in forest development in the Yukon, we're ready."

ABORIGINAL FIREFIGHTER WORKING IN THE FIRESMART PROGRAM, YUKON TERRITORY

Morris believes that to deal with the competing demands on the boreal forest, the most important thing is for First Nations to be part of forest planning from the outset. "In the Yukon, First Nations that have reached the final agreement stage often have greater jurisdictional power...than the territorial government. Yet we're still treated as third parties in land use decision making. We're seen as just another stakeholder, and that's wrong."

Webb agrees. "In the absence of compelling circumstances like court cases or big economic development opportunities, very few provinces have approached First Nations in good faith with the goal of cooperating to create a sustainable future within the boreal."

Both leaders agree that the future of Canada's boreal forest depends on rethinking the role of Aboriginal people. Says Webb, "Several jurisdictions have taken the first halting steps in the process of reallocating forest resources to Aboriginal people. In the northern boreal in Ontario, Quebec and Labrador, and to some extent the Yukon, timber reallocation processes are taking place with the active involvement of First Nations. But...in other areas, where someone will have to lose something for First Nations to regain an equitable share of resources, there's no real will from the Crown to be involved and no real understanding from industry that reallocation will be part of their social licence to operate within Indian territory."

GOVERNMENT

Rich Greenwood is Director of the Forest Management Branch of the Ontario Ministry of Natural Resources in Sault Ste. Marie.

Marc Ledoux is Associate Deputy Minister, Forests, with the Quebec Ministry of Natural Resources and Wildlife.

In Rich Greenwood's view, Canada's ideal boreal forest is a "non-diminishing, contiguous forest that runs from sea to sea, with attributes such as biodiversity, resilience and ecological functions maintained. It also has a completed system of parks and protected areas." Protected areas, he feels, should satisfy a number of requirements, including representativeness. And he agrees with Ken Higginbotham that we should use protected areas to learn more about boreal ecosystems. That means allowing natural functions and disturbances, such as fire, to occur. "How do we let natural forest fires continue in protected areas," he wonders, "without threatening either communities in and near this forest or the forest industry? Some say the only solution is to make our protected areas big. I think it's more complicated than that because of other values involved and pressures on forest use."

Marc Ledoux also believes that protected areas are central to the boreal's future. In fact, he lists four social and environmental goals that, in his view, are at the heart of managing the boreal forest: 1) developing ecosystem-based forest practices, 2) recognizing and respecting Aboriginal rights, 3) establishing networks of representative protected areas and 4) keeping some forest areas as wilderness. These four goals, he stresses, must be balanced against the economic objective of keeping Canada's forest industry competitive.

Better forest practices are essential in moving towards a well-managed boreal forest, says Ledoux. "It's the great challenge over the coming years. Sustainable forest management must be done in such a way that the ecological integrity of the forest is preserved. We must continue to develop forest practices that maintain biodiversity." To that end, the next generation of forest management plans must respect the goals of biodiversity. Innovation will also be critical, says Ledoux, since what's needed is nothing less than a new kind of forestry, one that balances commercial viability with environmental and social concerns.

"Marrying forest protection with the need for a strong forest industry represents a real challenge for Quebec," says Ledoux. But he heralds the 2004 report from the Commission for the Study of Public Forest Management in Quebec (the Coulombe report) as steering the province closer to the "new forestry" he envisions. "This report will lead us to preserve the heritage of our forest, including its attributes and its resources."

HOTCHKISS RIVER
E.S.E Trail

For Greenwood, educating Canadians about the boreal forest is another important task. "As time goes on, forest pressures will mount globally and debates about the boreal forest will intensify. It would be nice if the owners of Canada's boreal—the public—could more fully weigh the information they receive and better participate in the critical decisions, or at a minimum, be better able to consider final decisions against others [that were] proposed."

This task is complicated, he adds, because of the urban-rural split in our country. Many urbanites, lacking a direct connection to the forest, value forest land mostly for its recreational benefits, if they value it at all. "In university lectures," says Greenwood, "I've asked students to think of all the forest products they use during the first hour they're awake in the morning—from their bed frames, tissue paper and cereal boxes, to their kitchen cabinets, newspapers and coffee filters. They quickly realize how much they value these products, and that if we're interested only in protecting the forest, we won't also enjoy these important forest resources."

As for the question of how to resolve different perspectives, Ledoux feels that forest certification is an important vehicle. Through certification, environmentalists, industry and consumers can all agree on what the market will tolerate. Dialogue is also critical; it's therefore important to establish processes for people to participate in forest decision making, especially regionally. Says Ledoux, "Lack of trust leads some parties to say 'we are not ready to work together.' ...However, if parties work together on something concrete, with a short-term view, it's a first step. Often that will lead to new ways of doing things within a more favourable climate."

Ontario has gained experience in addressing divergent forest perspectives through, for instance, the Lands for Life process of the late 1990s. According to Greenwood, the province has identified four steps that can lead to successful outcomes. First, parties must make all their information available. Second, reasonable leaders must come together. "Some parties have no intention of finding a solution except the one they put forward," says Greenwood. "Others are willing to explore solutions... It's important to involve the sector leaders who are serious about working towards solutions and are willing to take some risk through compromise to find them."

The third step involves agreeing to a set of principles that reflect the key issues. In putting principles on the table, parties begin to acknowledge and learn about different points of view. The final step is to work toward solutions, keeping in mind the agreed-upon principles. "It's meaningful that when a party sacrifices something, that sacrifice is known to all," says Greenwood. "This results in building relationships, building understanding and building trust."

YOUTH

Sarah Lawson has a Master's degree in Forest Conservation from the University of Toronto and is an intern at the Lake Abitibi Model Forest in northeastern Ontario.

Aynslie Ogden is a Ph.D. student in the Department of Forest Resource Management at the University of British Columbia.

How will climate change affect the boreal forest, especially in the southwest Yukon? That's the question underlying Aynslie Ogden's doctoral research. Ogden echoes the Yukon's Eric Morris in saying that climate change will bring many surprises in the coming century—surprises that will challenge Canada's ability to manage the boreal forest.

Above all, says Ogden, climate change will alter natural disturbances in the boreal. For instance, forest fires will likely become more frequent and more intense, and pest infestations may shift. The result will be a cascade of changes across ecosystems, since disturbances affect everything from invasion by non-native species to the carbon balance of forests. These changes pose many questions for the boreal forest, says Ogden. "We'll be challenged as to the species that are appropriate to plant in changing conditions. And we'll be challenged with how to maintain the ecological integrity of boreal forests and to manage carbon pools and fluxes... How we manage the boreal will have to be an ongoing experiment."

For Ogden, boreal management must have two goals in preparing the forest to handle natural disturbances: to build resilience and to allow forests to adapt rather than trying to return them to their previous state. "Having a resilient forest is critical," she says. "Forests that experience fewer impacts and stresses will be better able to respond to the stresses of climate change."

Sarah Lawson also believes that Canada needs a fresh approach to forest management. "Given how the boreal forest crosses political and geographic boundaries, there has to be a new way of looking at ecosystems in the boreal region." An approach she finds especially intriguing is "reverse matrix" planning. To her, this approach means deciding which areas of the forest to conserve before industrial development begins. Ogden agrees that such an approach can benefit the boreal.

But Lawson and Ogden believe that conservation cannot preclude forest use, including for economic purposes. Both stress that human use is an integral part of the boreal landscape. "There are lots of people who use the boreal for their subsistence and economic livelihood," says Lawson. "It's not a pristine, untouched museum. It's a changing natural region."

And both researchers believe that Aboriginal people, with their long history in the boreal forest, must be key players in forest management and decision making. For Lawson, the pivotal role of Aboriginal and other communities means there can be no uniform management of the boreal forest. "Forest management has to be different in each region to reflect different needs. It's messier that way, but necessary." For Ogden, too, local involvement is a must: "It's important that the communities most connected to the boreal forest have a strong say in its management."

Ogden feels that cooperative planning is the only way to include communities and arrive at forest decisions that satisfy everyone. But Lawson takes a slightly different tack. While agreeing that partnerships are the way of the future, she questions whether satisfying all stakeholders is a realistic goal. "My first thought is whether the different perspectives really need resolving. It's good to have divergent roles and needs for the forest. That's part of being a democracy. We can work to achieve consensus, but people with different interests wil! always have different perspectives about the forest. That's a good thing, because we can all learn and benefit from others' views."

GLOSSARY

BIODIVERSITY

The variety and variability within and between living organisms from all sources, such as terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part.

BIOME

Major biotic community composed of all the plants and animals in a specific geographical region and smaller biotic communities. The smaller communities in a biome possess similarities in gross external appearances and gross climatic conditions.

BIOTIC

Pertaining to life; concerning the living component of the environment.

CLIMATE CHANGE

An alteration in measured quantities (e.g., precipitation, temperature, radiation, wind and cloudiness) within the climate system that departs significantly from previous average conditions and is seen to endure, bringing about corresponding changes in ecosystems and socioeconomic activity.

CORDILLERA

An elongated range of mountains.

ECOSYSTEM

A dynamic system of plants, animals and other organisms, together with the non-living components of the environment, functioning as an interdependent unit.

ETHOS

The totality of the distinctive ways of living that separate one group of people from another, especially their values.

EUTROPHICATION

The enrichment of water by nutrients, especially compounds of nitrogen and phosphorus, that will accelerate the growth of algae and higher forms of plant life. This enrichment may interfere with the normal ecological balance of the receiving waters.

GREENHOUSE GASES

Those gases, such as water vapour, carbon dioxide, tropospheric ozone, nitrous oxide and methane, that are transparent to solar radiation but opaque to longwave radiation. Their action is similar to that of glass in a greenhouse.

HARDWOOD

Trees whose leaves are not persistent and fall off at the end of a defined growing season or during a period of temperature or moisture stress. This is the predominant tree type in deciduous forests.

NANOTECHNOLOGY

The manufacture of materials and structures with dimensions that measure up to 100 nanometers (billionths of a metre).

NON-TIMBER FOREST PRODUCTS

Any commodity obtained from the forest that does not necessitate harvesting trees. Includes game animals, fur-bearers, nuts and seeds, berries, mushrooms, oils, foliage, medicinal plants, peat, fuelwood, forage, etc.

PARADIGM

A set of thoughts, perceptions and values that form particular vision of reality.

PLAIN

A relatively large, level, featureless topographic surface.

RESILIENCE

The capacity of a community or ecosystem to maintain or regain normal function and development following disturbance.

RIPARIAN AREAS

A terrestrial area, other than a coastal area, of variable width adjacent to and influenced by a perennial or intermittent body of water.

SHIELD

Large area of Crystalline Precambrian rock that forms the core of continents.

SILVICULTURE

The art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

SOFTWOOD

Cone-bearing trees with needles or scale-like leaves. This is the predominant tree type in coniferous forests.

STEWARDSHIP

The science, art and skill of responsible and accountable management of resources.

SUSTAINABLE FOREST MANAGEMENT

Management that maintains and enhances the long-term health of forest ecosystems for the benefit of all living things while providing environmental, economic, social and cultural opportunities for present and future generations.

SYMBIOTIC ASSOCIATION

The living together in intimate association of two dissimilar organisms, so that the cohabitation is mutually beneficial.

VALUE-ADDED PRODUCT

A product that has had value added to it through further processing. Examples of value-added wood products include windows, doors, kitchen cabinets, flooring and mouldings. Value-added pulp and paper products include such items as packaging, diapers, coated papers, tissue, business papers, stationery and other consumer paper products.

CONTACTS

The following is a list of organizations that can provide you with additional infomation about Canada's forests and the forest sector.

BC Market Outreach Network
1200-1130 West Pender Street
Vancouver BC V6E 4A4
Telephone: (604) 685-7507
1-866-992-2266
Fax: (604) 685-5373
E-mail: info@bcmon.ca
Web site: www.bcforestinformation.com

Canadian Federation of Woodlot Owners
304-259 Brunswick Street
Fredericton NB E3B 1G8
Telephone: (506) 459-2990
Fax: (506) 459-3515
E-mail: nbfwo@nbnet.nb.ca

Canadian Forestry Association
203-185 Somerset Street West
Ottawa ON K2P 0J2
Telephone: (613) 232-1815
Fax: (613) 232-4210
E-mail: cfa@canadianforestry.com
Web site: www.canadianforestry.com

Canadian Institute of Forestry
606-151 Slater Street
Ottawa ON K1P 5H3
Telephone: (613) 234-2242
Fax: (613) 234-6181
E-mail: cif@cif-ifc.org
Web site: www.cif-ifc.org

Canadian Model Forest Network Secretariat
Sir William Logan Building, 7th floor
580 Booth Street
Ottawa ON K1A 0E4
Telephone: (613) 992-5874
Fax: (613) 992-5390
E-mail: modelforest@nrcan.gc.ca
Web site: www.modelforest.net

Canadian Wildlife Federation
350 Michael Cowpland Drive
Kanata ON K2M 2W1
Telephone: (613) 599-9594
1-800-563-WILD
Fax: (613) 599-4428
E-mail: info@cwf-fcf.org
Web site: www.cwf-fcf.org

Council of Forest Industries
Pender Place I Business Building
1501-700 West Pender Street
Vancouver BC V6C 1G8
Telephone: (604) 684-0211
Fax: (604) 687-4930
E-mail: info@cofi.org
Web site: www.cofi.org

Ducks Unlimited Canada
1 Mallard Bay at Highway 220
P.O. Box 1160
Stonewall MB R0C 2Z0
Telephone: (204) 467-3000
1-800-665-3825
Fax: (204) 467-9028
E-mail: webfoot@ducks.ca
Web site: www.ducks.ca

Forest Engineering Research Institute of Canada (FERIC)
580, boulevard St-Jean
Pointe-Claire QC H9R 3J9
Telephone: (514) 694-1140
Fax: (514) 694-4351
Web site: www.feric.ca

Forest Products Association of Canada
410-99 Bank Street
Ottawa ON K1P 6B9
Telephone: (613) 563-1441
Fax: (613) 563-4720
E-mail: ottawa@fpac.ca
Web site: www.fpac.ca

Forintek Canada Corp.
2665 East Mall
Vancouver BC V6T 1W5
Telephone: (604) 224-3221
Fax: (604) 222-5690
E-mail: info@forintek.ca
Web site: www.forintek.ca

Government of Alberta
Ministry of Sustainable Resource Development [Public Lands and Forests Division]
Petroleum Plaza South Tower
9915-108 Street
Edmonton AB T5K 2G8
Telephone: (780) 415-1396
Fax: (780) 422-6068
Web site: www3.gov.ab.ca/srd

Government of British Columbia
Ministry of Forests and Range
[Forest Practices Branch]
727 Fisgard Street, 9th floor
P.O. Box 9513 Stn. Prov. Govt.
Victoria BC V8W 9C2
Telephone: (250) 387-1946
Fax: (250) 387-1467
Web site: www.gov.bc.ca/for

Government of Canada
Natural Resources Canada
[Canadian Forest Service]
Sir William Logan Building, 8th floor
580 Booth Street
Ottawa ON K1A 0E4
Telephone: (613) 947-7341
Fax: (613) 947-9033
E-mail: cfs-scf@nrcan.gc.ca
Web site: www.nrcan.gc.ca/cfs-scf

Government of Manitoba
Department of Conservation
[Forestry Branch]
200 Saulteaux Crescent
P.O. Box 70
Winnipeg MB R3J 3W3
Telephone: (204) 945-7989
Fax: (204) 948-2671
E-mail: forestinfo@gov.mb.ca
Web site: www.gov.mb.ca/conservation/forestry

Government of New Brunswick
Department of Natural Resources
[Forest Management]
Hugh John Flemming Forestry Centre
1350 Regent Street
P.O. Box 6000
Fredericton NB E3B 5H1
Telephone: (506) 453-2516
Fax: (506) 453-6689
Web site: www.gnb.ca

Government of Newfoundland and Labrador
Department of Natural Resources
[Forest Resources Branch]
Natural Resources Building, 5th floor
50 Elizabeth Avenue
P.O. Box 8700
St. John's NL A1B 4J6
Telephone: (709) 729-2704
Fax: (709) 729-3374
Web site: www.nr.gov.nl.ca/forestry

Government of Nova Scotia
Department of Natural Resources
[Forestry Division]
Arlington Place
664 Prince Street
P.O. Box 68
Truro NS B2N 5B8
Telephone: (902) 893-5653
Fax: (902) 893-6102
E-mail: forestry@gov.ns.ca
Web site: www.gov.ns.ca/natr/forestry

Government of Nunavut
Department of Environment
P.O. Box 1000 Station 1300
Iqaluit NU X0A 0H0
Telephone: (867) 975-5900
1-866-222-9063
Fax: (867) 975-5990
Web site: www.gov.nu.ca

Government of Ontario
Ministry of Natural Resources
[Forests Division]
Roberta Bondar Place
400-70 Foster Drive
Sault Ste Marie ON P6A 6V5
Telephone: (705) 945-6746
1-800-667-1940
Fax: (705) 945-5977
Web site: www.mnr.gov.on.ca

Government of Prince Edward Island
Department of Environment, Energy and Forestry [Forestry and Land Resource Modeling]
Jones Building
11 Kent Street
P.O. Box 2000
Charlottetown PE C1A 7N8
Telephone: (902) 368-5000
Fax: (902) 368-5830
Web site: www.gov.pe.ca/enveng

Government of Québec
Ministère des Ressources naturelles et de la Faune [Secteur des forêts]
880, chemin Sainte-Foy, 10^{e} étage
Québec QC G1S 4X4
Telephone: (418) 627-8652
Fax: (418) 646-4335
E-mail: forets@mrnf.gouv.qc.ca
Web site: www.mrnf.gouv.qc.ca

Government of Saskatchewan
Department of Environment
[Compliance, Fire and Forest Division]
526-3211 Albert Street
Regina SK S4S 5W6
Telephone: (306) 787-4931
Fax: (306) 787-2947
Web site: www.se.gov.sk.ca

Government of the Northwest Territories
Department of Environment and Natural Resources
[Forest Management Division]
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Telephone: (867) 872-7700
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Web site: forestmanagement.enr.gov.nt.ca

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International Model Forest Network Secretariat
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Fax: (613) 234-7457
E-mail: imfns@idrc.ca
Web site: www.idrc.ca/imfn

Maritime Lumber Bureau
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Amherst NS B4H 4A1
Telephone: (902) 667-3889
Fax: (902) 667-0401
E-mail: mlb@ns.sympatico.ca
Web site: www.mlb.ca

National Aboriginal Forestry Association
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Ottawa ON K1S 3W4
Telephone: (613) 233-5563
Fax: (613) 233-4329
E-mail: nafa@web.ca
Web site: www.nafaforestry.org

National Forest Strategy Coalition Secretariat
Sir William Logan Building, 8th floor
580 Booth Street
Ottawa ON K1A 0E4
Telepho[illegible](613) 947-9031
Fax: (613) 947-9033
E-mail: nfsc@forest.ca
Web site: nfsc.forest.ca

National Round Table on the Environment and the Economy
200-344 Slater Street
Ottawa ON K1R 7Y3
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Fax: (613) 992-7385
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Pulp and Paper Research Institute of Canada (Paprican)
570, boulevard St-Jean
Pointe-Claire QC H9R 3J9
Telephone: (514) 630-4100
Fax: (514) 630-4134
E-mail: info@paprican.ca
Web site: www.paprican.ca

Quebec Forest Industry Council
1175, avenue Lavigerie, bureau 200
Sainte-Foy QC G1V 4P1
Telephone: (418) 657-7916
Fax: (418) 657-7971
E-mail: info@qfic.qc.ca
Web site: www.cifq.qc.ca

Sustainable Forest Management Network
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Fax: (780) 492-8160
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Web site: sfm-1.biology.ualberta.ca

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Fax: (613) 567-5270
E-mail: tcf@treecanada.ca
Web site: www.treecanada.ca

Wildlife Habitat Canada
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Ottawa ON K2C 2B5
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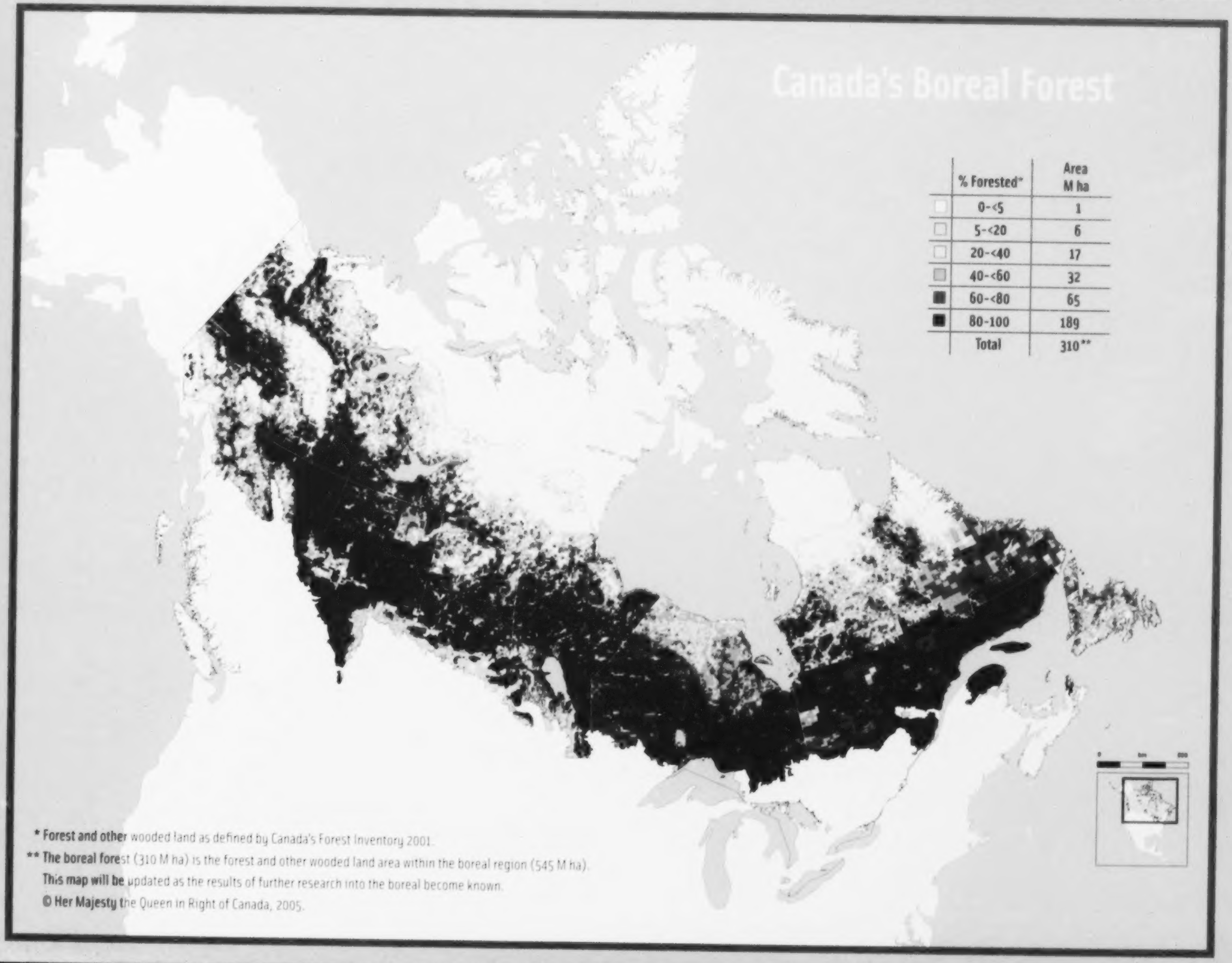
1-800-669-7919
Fax: (613) 722-3318
E-mail: reception@whc.org
Web site: www.whc.org



Canada's Boreal Forest

	% Forested*	Area M ha
☐	0-<5	1
☐	5-<20	6
☐	20-<40	17
▨	40-<60	32
■	60-<80	65
■	80-100	189
	Total	310**

* **Forest and other** wooded land as defined by Canada's Forest Inventory 2001.

** **The boreal forest** (310 M ha) is the forest and other wooded land area within the boreal region (545 M ha).

This map will be updated as the results of further research into the boreal become known.

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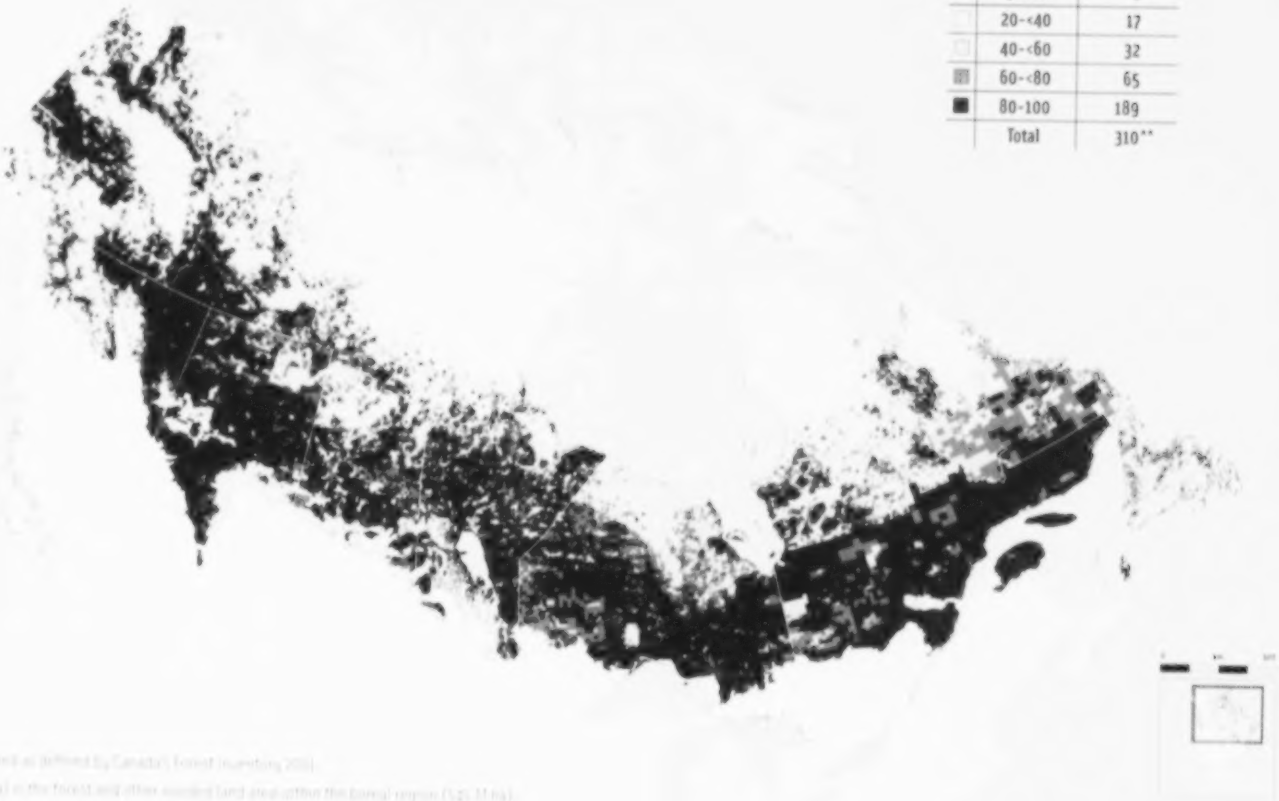

	% Forested*	Area M ha
	0-<5	1
☐	5-<20	6
☐	20-<40	17
☐	40-<60	32
▨	60-<80	65
■	80-100	189
	Total	310**

* Forest and other wooded land as defined by Canada's Forest Inventory 2001.

** The boreal forest (310 M ha) is the forest and other wooded land area within the boreal region ([illegible] M ha).

This map will be updated as the results of further research into the boreal become known.

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Forest-dependent Census subdivisions in Canada's boreal region

Province / Electoral District	Census Subdivision (Communities)		
Yukon Territory			
1 - Yukon	Carmacks (2)		
Northwest Territories			
2 - Western Arctic	Hay River Dene 1 (1)		
British Columbia			
3 - Prince George - Peace River	Chetwynd (1) Fort Nelson (1)	Dawson Creek (1) Northern Rockies A (5)	East Moberly Lake 169 (1) Peace River E (5)
Alberta			
4 - Peace River	Clear Hills No. 21 (1) Grande Prairie County No. 1 (4) Hines Creek (1) Northern Lights No. 22 (7)	East Peace No 131 (7) Grimshaw (1) Mackenzie No. 23 (15) Peace River (1)	Grande Prairie (1) High Level (1) Manning (1) Sexsmith (1)
5 - Athabasca	Athabasca (1) Boyle (1) High Prairie (1) Opportunity No. 17 (8)	Athabasca County No. 12 (6) Drift Pile River 150 (1) Lakeland County (7) Slave Lake (1)	Big Lakes (13) East Peace No 131 (2) Lesser Slave River No 124 (10) Swan River 150E (1)
6 - Yellowhead	Alexis 133 (1) Mayerthorpe (1) Yellowhead County (9)	Edson (1) Whitecourt (1)	Hinton (1) Woodlands County (6)
7 - Wild Rose	Sundre (1)		
Saskatchewan			
8 - Churchill River	Big River (1) Chitek Lake 191 (1) Loon Lake No. 561 (4) Morin Lake 217 (1) Waterhen 130 (1)	Big River No. 555 (4) Green Lake (1) Meadow Lake (1) Shoal Lake 28A (1) Flying Dust First Nation 105 (Meadow Lake 105) (1)	Canoe Lake 165 (1) Hudson Bay No. 394 (1) Meadow Lake No. 588 (4) Sturgeon Lake 101 (1)
9 - Battlefords - Lloydminster	Glaslyn (1)		
10 - Prince Albert	Buckland No. 491 (3) Moose Range No. 486 (1) Prince Albert No. 461 (4)	Carrot River (1) Muskoday First Nation (1) Wahpaton 94A (1)	Garden River No. 490 (2) Prince Albert (2)
11 - Yorkton - Melville	Hudson Bay (1) Sturgis (1)	Hudson Bay No. 394 (7)	Porcupine No. 395 (5)
Manitoba			
12 - Churchill	Kelsey (Carrot Valley) (5) Division No. 21, Unorganized (23)	Moose Lake 31A (1)	The Pas (1)
13 - Dauphin - Swan River	Hillsburg (1) Swan River (3)	Minitonas (1)	Mountain (North) (4)
14 - Selkirk - Interlake	Alexander (2)		
15 - Provencher	Alexander (5) Powerview (1)	Pine Falls (1) Steinbach (1)	Piney (10)
Ontario			
16 - Kenora	Dryden (2) Kenora, Unorganized (17) Sioux Lookout (1)	Ear Falls (1) Lac Seul 28 (1) Thunder Bay, Unorganized (3)	English River 21 (1) Machin (1)
17 - Timmins - James Bay	Black River-Matheson (5) Kenora, Unorganized (2) Timiskaming, Unorganized, West Part (4)	Cochrane (1) Cochrane, Unorganized, North Part (2)	Iroquois Falls (5)
18 - Thunder Bay - Rainy River	Thunder Bay, Unorganized (1)		
19 - Thunder Bay - Superior North	Armand 83 (1) Marathon (1) Schreiber (1)	Dorion (1) Nipigon (1) Shuniah (1)	Greenstone (8) Red Rock (1) Thunder Bay, Unorganized (8)
Ontario, Cont'd.			
20 - Algoma - Manitoulin - Kapuskasing	Chapleau (1) Hearst (2) Mattice-Val Côté (1) Opasatika (2) Val Rita-Harty (1) Algoma, Unorganized, North Part (3)	Dubreuilville (1) Hornepayne (1) Michipicoten (1) Smooth Rock Falls (1) White River (1)	Fauquier-Strickland (2) Kapuskasing (8) Moonbeam (1) Thunder Bay, Unorganized (2) Cochrane, Unorganized, North Part (2) Sudbury, Unorganized, North Part (3)
21 - Sault Ste. Marie	Algoma, Unorganized, North Part (1)		
22 - Nickel Belt	Sudbury, Unorganized, North Part (2)		
Quebec			
23 - Abitibi - Temiscamingue	Amos (2) Barraute (1) Dupuy (1) La Sarre (1) Macamic (1) Pikogan (1) Sainte-Germaine-Boule (1) Taschereau (1)	Authier (1) Berry (2) Gallichan (1) Landrienne (1) Normetal (1) Poularies (2) Sainte-Gertrude-Manneville (1) Trécesson (2)	Authier-Nord (1) Colombourg (1) La Morandière (1) Launay (1) Palmarolle (1) Saint-Dominique-du-Rosaire (1) Sainte-Hélène-de-Mancebourg (1)
24 - Nunavik - Eeyou	Chapais (1) Matagami (1) Val-d'Or (2) Waswanipi (1)	Chibougamau (1) Senneterre (2) Val-Senneville (1)	Lebel-sur-Quévillon (1) Sullivan (1) Vassan (1)
25 - Saint - Maurice - Champlain	Obedjiwan 28 (1) Saint-Tite (1)	Parent (1)	Saint-Adelphe (1)
26 - Roberval	Chambord (1) Roberval (1) Saint-Edmond (1) Saint-François-de-Sales (1)	La Doré (1) Saint-André-du-Lac-Saint-Jean (1) Sainte-Hedwidge ([illegible]) Saint-Thomas-Didyme (2)	Lac-Bouchette (1) Saint-Augustin (1) Sainte-Jeanne-d'Arc (1)
27 - Chicoutimi- Le Fjord	Ferland-et-Boilleau (2)	Petit-Saguenay (1)	Sainte-Rose-du-Nord (1)
28 - Jonquière - Alma	Saint-David-de-Falardeau (1)		
29 - Portneuf	Pont-Rouge (1) Saint-Léonard-de-Portneuf (2)	Rivière-à-Pierre (1) Saint-Raymond (2)	Sainte-Brigitte-de-Laval (1)
30 - Charlevoix - Montmorency	Beaupré (2) Colombier (2) L'Ange-Gardien (1) Notre-Dame-des-Monts (1) Sainte-Anne-de-Portneuf (2) Saint-Tite-des-Caps (1)	Boischatel (1) Forestville (1) Les Escoumins (1) Saint-Aimé-des-Lacs (1) Saint-Hilarion (1)	Clermont (1) La Malbaie (5) Longue-Rive (2) Sainte-Anne-de-Beaupré (1) Saint-Joachim (3)
31 - Manicouagan	Baie-Comeau (2) Rivière-Saint-Jean (2)	Ragueneau (1)	Rivière-Pentecôte (1)
32 - Matapédia-Matane	La Martre (1) Sainte-Anne-des-Monts--Tourelle (2)	Marsoui (2) Sainte-Florence (1)	Saint-Adelme (1)
33 - Gaspésie-Îles-de-la-Madeleine	Carleton--Saint-Omer (1) Nouvelle (1) Saint-François-d'Assise (1)	Grande-Vallée (1) Pointe-à-la-Croix (1)	New Richmond (1) Saint-Alphonse (1)
Terre-Neuve-et-Labrador			
34 - Humber - St. Barbe - Baie Verte	Cormack (1) Division No. 8, Subd. P (5) Humber Arm South (1) Mount Moriah (1) South Brook (1)	Corner Brook (3) Hampden (3) Massey Drive (1) Pasadena (1) Glenburnie-Birchy Head-Shoal Brook (1)	Division No. 8, Subd. C (7) Hawke's Bay (1) Middle Arm (1) Roddickton (1)
35 - Bonavista - Exploits	Badger (1) Botwood (1) Grand Falls-Windsor (2)	Birchy Bay (1) Division No. 7, Subd. E (11) Northern Arm (1)	Bishop's Falls (1) Glenwood (1)
36 - Random - Burin-St. George's	Division No. 4, Subd. D (8) Stephenville (1)	Kippens (1)	Seal Cove (Fortune Bay) (1)

Numbers associated with the Electoral Districts correspond to those on the map.
Numbers in parentheses indicate number of communities within the Census subdivision.

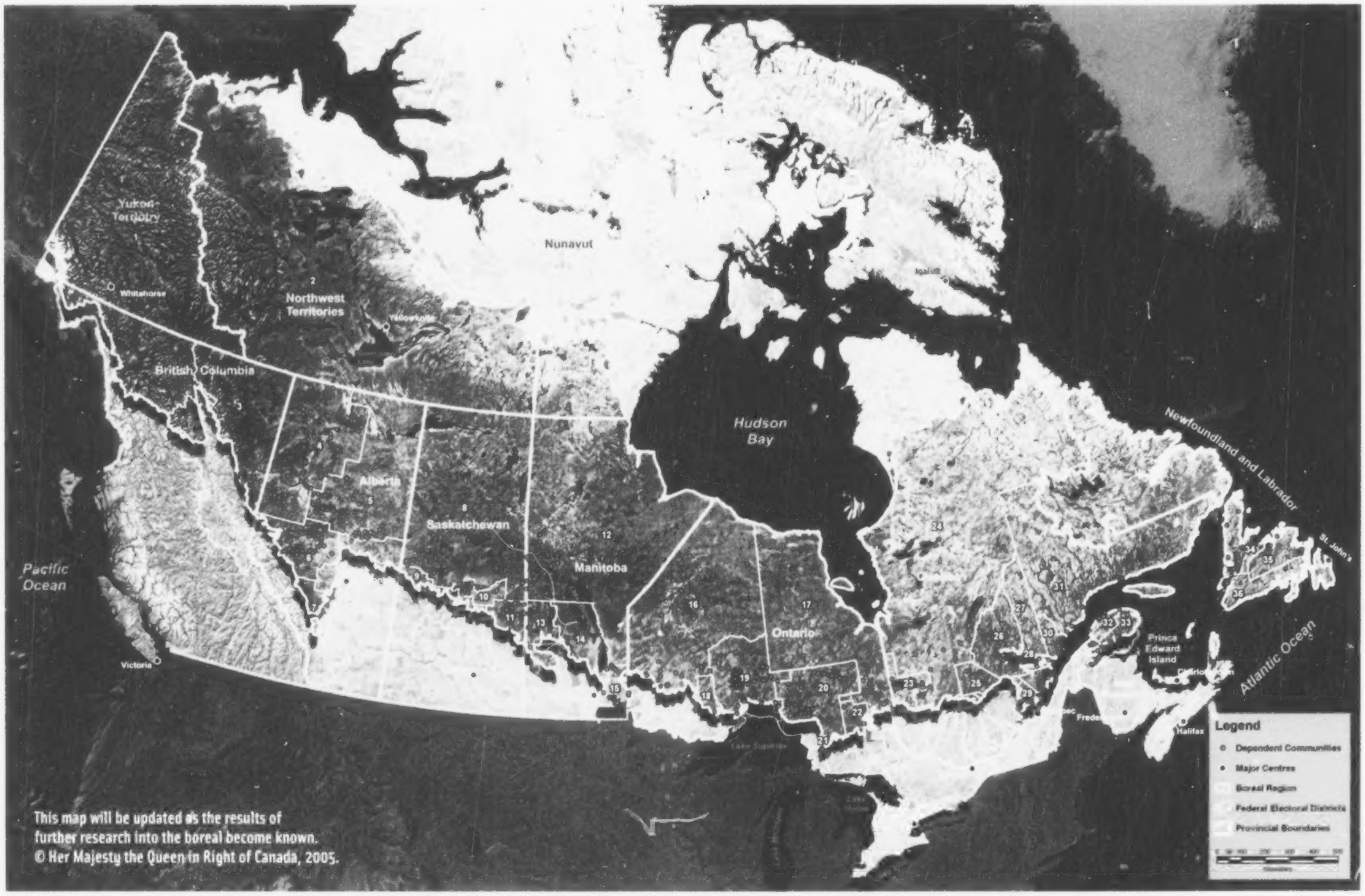
Forest-dependent Census subdivisions in Canada's boreal region

Province / Electoral District	Census Subdivision (Communities)		
Yukon Territory			
1 - Yukon	[illegible]		
Northwest Territories			
2 - Western Arctic	Hay River Dene 1 (1)		
British Columbia			
3 - Prince George - Peace River	Chetwynd (1) Fort Nelson (1)	[illegible] [illegible]	[illegible] [illegible]
Alberta			
4 - Peace River	Clear Hills No. 21 (1) Grande Prairie County No. 1 (6) High Level (1) Northern Lights No. 22 (1)	[illegible] [illegible] Mackenzie No. 23 (1) [illegible]	[illegible] [illegible] [illegible] [illegible]
5 - Athabasca	Athabasca (1) Boyle (1) High Prairie (1) Opportunity No. 17 (6)	Athabasca County No. 12 (1) Driftpile River 150 (1) Lakeland County (1) Slave Lake (1)	Big Lakes (1) [illegible] [illegible] [illegible]
6 - Yellowhead	[illegible] (1) Mayerthorpe (1) Yellowhead County (2)	Edson (1) Whitecourt (1)	[illegible] Woodlands County (2)
7 - Wild Rose	Sundre (1)		
Saskatchewan			
8 - Churchill River	Big River (1) Canoe Lake 165 (1) [illegible] Lake No. 162 (4) [illegible] Lake 217 (1) Waterhen 130 (1)	Big River No. 555 (1) Green Lake (1) Meadow Lake (1) Shoal Lake 28A (1) Flying Dust First Nation 105 (Meadow Lake 105) (1)	[illegible] (1) [illegible] (1) Meadow Lake No. 588 (1) Sturgeon Lake 101 (1)
9 - Battlefords - Lloydminster	[illegible] (1)		
10 - Prince Albert	Buckland No. 491 (1) [illegible] [illegible]	[illegible] (1) Muskoday First Nation (1) Wahpeton 94A (1)	Garden River No. 490 (2) Prince Albert (1)
11 - Yorkton - Melville	Hudson Bay (1) [illegible]	Hudson Bay No. 394 (1)	Porcupine No. 395 (2)
Manitoba			
12 - Churchill	[illegible] [illegible] No. 21, Unorganized (2)	[illegible] (1)	The Pas (1)
13 - Dauphin - Swan River	[illegible] (1) [illegible]	[illegible] (1)	[illegible] (1)
14 - Selkirk - Interlake	[illegible] (2)		
15 - Provencher	[illegible] [illegible]	[illegible] (1) [illegible] (1)	[illegible] (1)
Ontario			
16 - Kenora	[illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]	[illegible] [illegible]
17 - Timmins - James Bay	[illegible] [illegible] [illegible]	[illegible] [illegible]	[illegible]
18 - Thunder Bay - Rainy River	[illegible]		
19 - Thunder Bay - Superior North	[illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]
Ontario, Cont'd			
20 - Algoma - Manitoulin - Kapuskasing	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
21 - Sault Ste. Marie	[illegible]		
22 - Nickel Belt	[illegible]		
Quebec			
23 - Abitibi - Témiscamingue	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
24 - Nunavik - Eeyou	[illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]
25 - Saint-Maurice - Champlain	[illegible] [illegible]	[illegible]	[illegible]
26 - Roberval	[illegible] (1) [illegible] (1) [illegible] (1) Saint-François-de-Sales (1)	[illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]
27 - Chicoutimi - Le Fjord	Ferland-et-Boilleau (2)	Petit-Saguenay (1)	[illegible]
28 - Jonquière - Alma	Saint-David-de-Falardeau (1)		
29 - Portneuf	Pont-Rouge (1) Saint-Léonard-de-Portneuf (2)	Rivière-à-Pierre (1) Saint-Raymond (2)	[illegible]
30 - Charlevoix - Montmorency	Beaupré (2) Colombier (2) L'Anse-[illegible] (1) Notre-Dame-des-Monts (1) Sainte-Anne-de-Portneuf (2) Saint-Tite-des-Caps (1)	Boischatel (1) Forestville (1) Les Escoumins (1) Saint-Aimé-des-Lacs (1) Saint-Hilarion (1)	[illegible] [illegible] [illegible] Sainte-Anne-de-[illegible] Saint-Joachim (1)
31 - Manicouagan	Baie-Comeau (2) Rivière-Saint-Jean (2)	[illegible] (1)	[illegible]
32 - Matapédia-Matane	La Martre (1) Sainte-Anne-des-Monts - Tourelle (2)	[illegible] (1) [illegible]	[illegible]
33 - Gaspésie-Îles-de-la-Madeleine	Carleton-Saint-Omer (1) Nouvelle (1) Saint-François-d'Assise (1)	[illegible] (1) [illegible]	[illegible] [illegible]
Terre-Neuve-et-Labrador			
*34 - Humber - St. Barbe - **Baie Verte***	[illegible] (1) Division No. [illegible] Humber Arm South (1) Mount Moriah (1) [illegible] (1)	[illegible] [illegible] [illegible] [illegible] [illegible]	[illegible] [illegible] [illegible] [illegible]
35 - Bonavista - Exploits	[illegible] (1) [illegible] [illegible]	[illegible] [illegible] [illegible]	[illegible] [illegible]
36 - Random - Burin - St. George's	[illegible] [illegible]	[illegible]	[illegible]

COMMUNITIES DEPENDENT ON Canada's BOREAL REGION

This map depicts the communities, displayed as red points, within Statistics Canada Census subdivisions whose economy is partially dependent on Canada's boreal region. Only Elections Canada Federal Electoral Districts intersecting the boreal region are shown. The Federal Electoral District numbers correspond to those listed in the table below.

There are 230 Census subdivisions inside the boreal region whose dependence on forestry represents at least 20 percent of its total economy (2001). Within these Census subdivisions, there are approximately 572 forestry-dependent communities. The influence of the boreal, however, is larger than this, since there are additional forestry-dependent communities that are geographically within the proximity, but located outside of the boreal region boundary.


Yukon Territory
Whitehorse
Northwest Territories
Yellowknife
Nunavut
Iqaluit
British Columbia
Alberta
Saskatchewan
Manitoba
Ontario
Hudson Bay
Newfoundland and Labrador
St. John's
Prince Edward Island
Atlantic Ocean
Halifax
Pacific Ocean
Victoria
Lake Superior
Legend
Dependent Communities
Major Centres
Boreal Region
Federal Electoral Districts
Provincial Boundaries

This map will be updated as the results of further research into the boreal become known.

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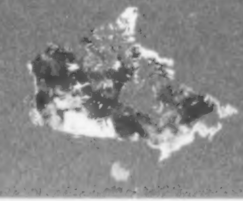


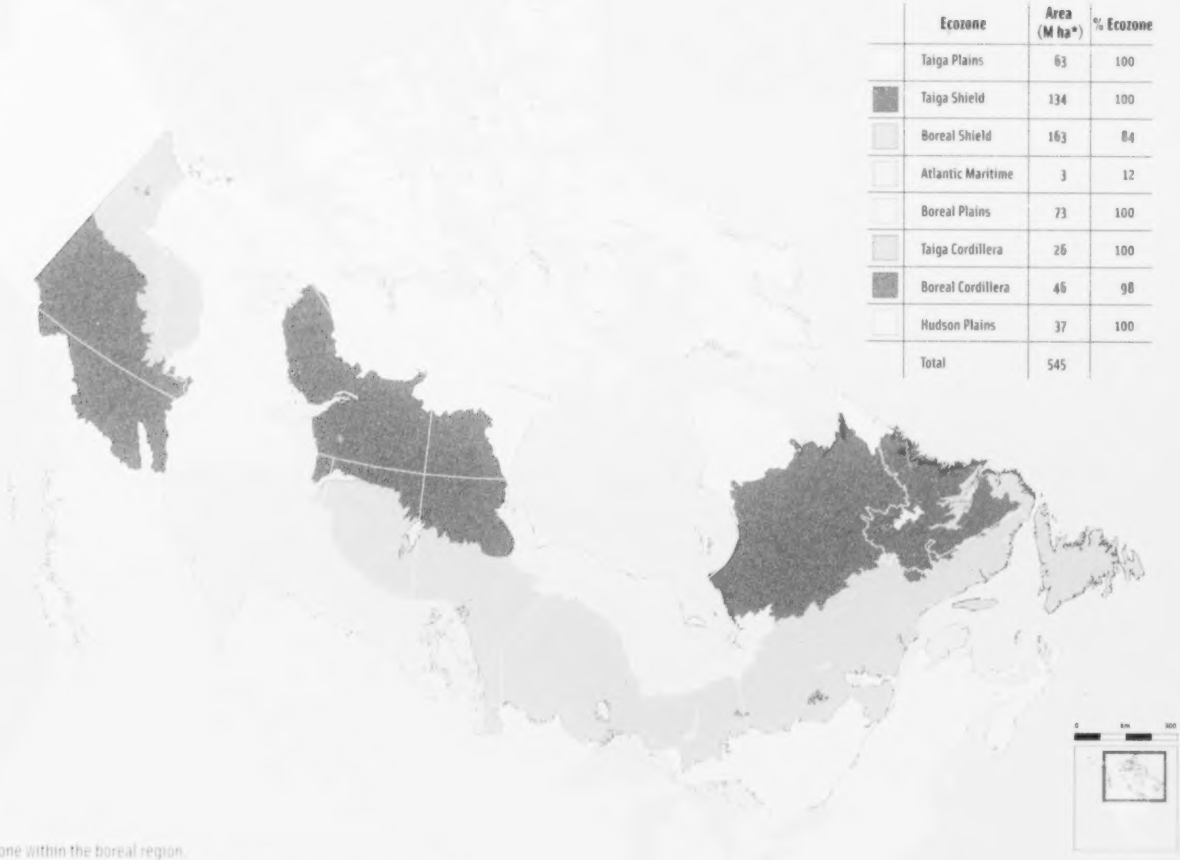
Canada's BOREAL

The two maps below depict the boreal forest and the boreal region of Canada. The boreal forest is the 310 million hectares of forest that lie within the 545 million hectares of boreal region. The Canadian portion of the boreal forest starts in the Yukon and northeastern British Columbia, and stretches across the northern parts of the Prairie provinces, Quebec and Ontario, to Labrador and Newfoundland.

Canada's land area is divided into 15 ecozones that represent large ecosystem units and have characteristic landforms and climate. Eleven of these ecozones are in forest areas; the boreal forest extends across a portion of eight of them.

Four of the eight are the Taiga Cordillera, Taiga Plains, Taiga Shield and Hudson Plains which, together, form the northern tier of the forest. Three other ecozones form the southern tier of "closed"–more or less continuous–boreal forest. These are the Boreal Cordillera in the western mountains, the Boreal Plains in the prairies, and the Boreal Shield from Alberta to Newfoundland. The eighth ecozone is the Atlantic Maritime, which represents a small portion of Canada's boreal forest in the Cape Breton Highlands of Nova Scotia and Quebec's Îles-de-la-Madeleine.

(For additional information on ecological boundaries, see the National Ecological Framework of Canada at http://sis.agr.gc.ca/cansis/nsdb/ecostrat/index.html.)



	Ecozone	Area (M ha*)	% Ecozone
□	Taiga Plains	63	100
■	Taiga Shield	134	100
▒	Boreal Shield	163	84
□	Atlantic Maritime	3	12
□	Boreal Plains	73	100
▒	Taiga Cordillera	26	100
■	Boreal Cordillera	46	98
□	Hudson Plains	37	100
	Total	545	

* Area of each ecozone within the boreal region.

This map will be updated as the results of further research into the boreal become known.

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